MSC1000G

Management Switch Card

User's Guide

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ZyXEL

www.zyxel.com

About This User's Guide

Intended Audience

This manual is intended for administrators who want to configure the IES-5000 using the web configurator or command line interface. You should have at least a basic knowledge of TCP/IP networking concepts and topology.

Related Documentation

- IES-5000 Series User's Guide

  Refer to the IES-5000 Series User's Guide for directions on installation, connections, maintenance, hardware trouble shooting and safety warnings.
- ALC1248G, ALC1272G, SLC1248G and VLC1224G Line Card User's Guides

  These user's guides introduce the DSL line cards and give detailed information about the line card features and hardware.
- ZyXEL Web Site

  Please refer to www.zyxel.com for additional support documentation and product certifications.

User Guide Feedback

Help us help you. Send all User Guide-related comments, questions or suggestions for improvement to the following address, or use e-mail instead. Thank you!

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Document Conventions

Warnings and Notes

These are how warnings and notes are shown in this User's Guide.

Warnings tell you about things that could harm you or your device.

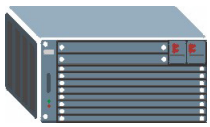
Notes tell you other important information (for example, other things you may need to configure or helpful tips) or recommendations.

Syntax Conventions

- The MSC1000G Management Switch Card may be referred to as the "MSC1000G", the "MSC", the "management switch card", the "device", the "switch" or the "system" in this User's Guide.
- "IES-5000" refers to the IES-5000 series system including the main and splitter chassis and their cards. The IES-5000 may be referred to as the "IES".
- The ALC1248G-51 for ADSL over POTS (Annex A) Line Card may be referred to as the "ALC1248G", the "ALC" or the "line card" in this User's Guide.
- The ALC1248G-53 for ADSL over ISDN (Annex B) Line Card may be referred to as the "ALC1248G", the "ALC" or the "line card" in this User's Guide.
- The ALC1272G ADSL2/2+ Line Card may be referred to as the "ALC1272G", the "ALC" or the "line card" in this User's Guide.
- The SLC1248G SHDSL Line Card may be referred to as the "SLC1248G", the "SLC" or the "line card" in this User's Guide.
- The VLC1224G VDSL Line Card may be referred to as the "VLC1224G", the "VLC" or the "line card" in this User's Guide.
- Product labels, screen names, field labels and field choices are all in **bold** font.
- A key stroke is denoted by square brackets and uppercase text, for example, [ENTER] means the "enter" or "return" key on your keyboard.
- "Enter" means for you to type one or more characters and then press the [ENTER] key. "Select" or "choose" means for you to use one of the predefined choices.
- A right angle bracket (>) within a screen name denotes a mouse click. For example, **Maintenance > Log > Log Setting** means you first click **Maintenance** in the navigation panel, then the **Log** sub menu and finally the **Log Setting** tab to get to that screen.
- Units of measurement may denote the "metric" value or the "scientific" value. For example, "k" for kilo may denote "1000" or "1024", "M" for mega may denote "1000000" or "1048576" and so on.

Icons Used in Figures

Figures in this User's Guide may use the following generic icons. The IES-5000 icon is not an exact representation of your device.

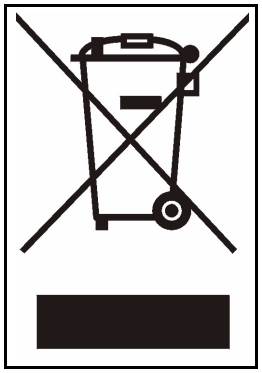
IES-5000 	Computer	Notebook computer
Server	Telephone	Switch
Router		

Safety Warnings

For your safety, be sure to read and follow all warning notices and instructions.

- Do NOT use this product near water, for example, in a wet basement or near a swimming pool.
- Do NOT expose your device to dampness, dust or corrosive liquids.
- Do NOT store things on the device.
- Do NOT install, use, or service this device during a thunderstorm. There is a remote risk of electric shock from lightning.
- Connect ONLY suitable accessories to the device.
- ONLY qualified service personnel should service or disassemble this device.
- Make sure to connect the cables to the correct ports.
- Place connecting cables carefully so that no one will step on them or stumble over them.
- Always disconnect all cables from this device before servicing or disassembling.
- Do not use the device outside, and make sure all the connections are indoors. There is a remote risk of electric shock from lightning.
- CAUTION: RISK OF EXPLOSION IF BATTERY (on the motherboard) IS REPLACED BY AN INCORRECT TYPE. DISPOSE OF USED BATTERIES ACCORDING TO THE INSTRUCTIONS. Dispose them at the applicable collection point for the recycling of electrical and electronic equipment. For detailed information about recycling of this product, please contact your local city office, your household waste disposal service or the store where you purchased the product.
- Do NOT obstruct the device ventilation slots, as insufficient airflow may harm your device.
- Use only No. 26 AWG (American Wire Gauge) or larger telecommunication line cord.
- Warning! To avoid risk of electric shock, remove only one card at a time and do not place fingers or objects inside the chassis. Cover empty slots with slot covers.
- Refer also to the IES-5000 Series User's Guide and follow all safety warnings for installation, connections, maintenance and hardware trouble shooting.

This product is recyclable. Dispose of it properly.



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PART I
Introduction

Getting to Know Your MSC1000G (47)
Hardware Connections (57)

1

Getting to Know Your MSC1000G

This chapter introduces the main applications of the MSC1000G. It also introduces the ways you can manage the MSC1000G.

1.1 Introduction

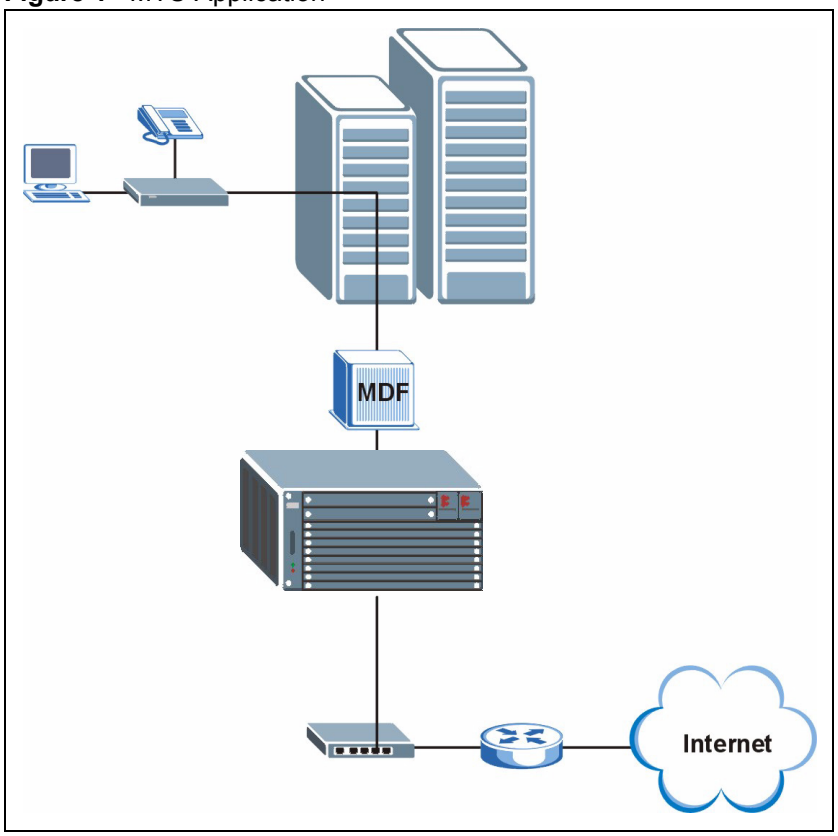
The IES-5000 series is perfect for ISPs or large building applications seeking to provide high bandwidth broadband services to subscribers while minimizing costs.

The MSC1000G (Management Switch Card Gigabit) centralizes the management of all of the Integrated Ethernet Switch's DSL line cards. You can configure and maintain the DSL line cards through the management switch card; thus eliminating the need to connect to each line card individually. It also provides Gigabit ports and slots for connecting to other Ethernet switches. See Appendix A on page 603 for a complete list of features.

1.1.1 Applications

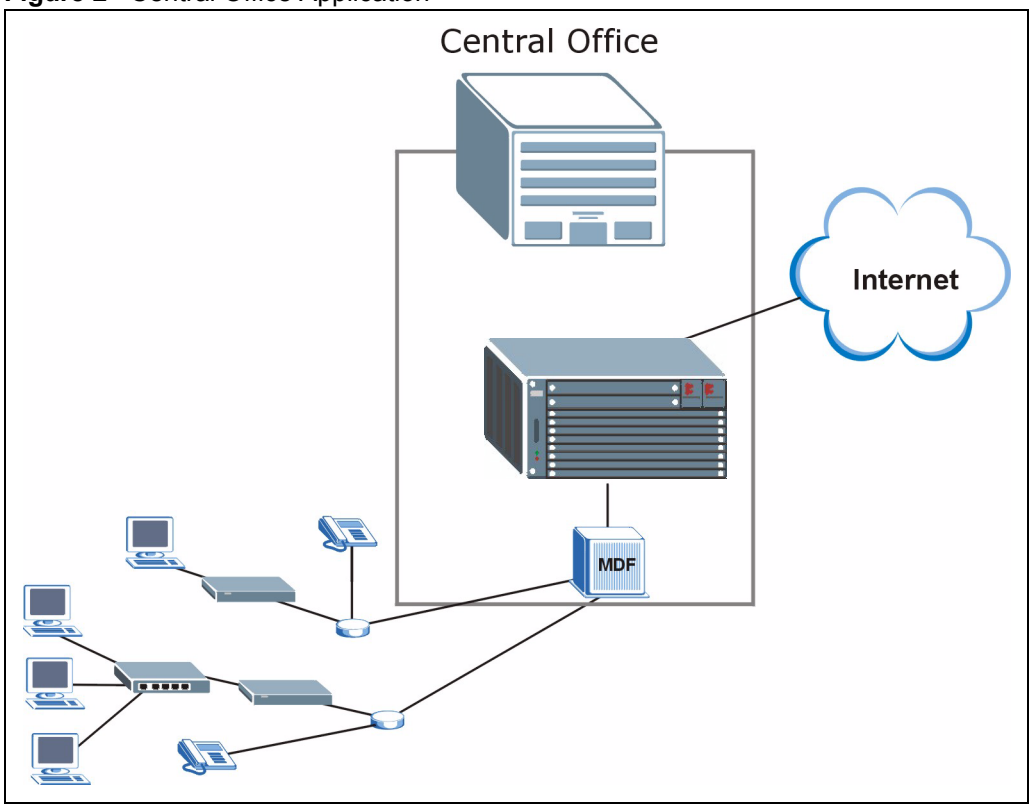
- The IES-5000 can provide Internet access and multimedia services for Multiple Tenant Units (MTU).The following diagram depicts a typical application of the IES-5000 with DSL modems, in a large residential building, that leverages existing phone line wiring to provide Internet access to all tenants. ADSL service can coexist with voice service on the same line.

Figure 1 MTU Application



- The IES-5000 provides DSL service over telephone wires to subscribers in a Central Office (CO) application. The following figure shows the IES-5000 set up in a telephone company's central office.

Figure 2 Central Office Application



- Other applications include telemedicine, surveillance systems, remote servers systems, cellular base stations and high-quality videoconferencing.

1.2 Ways to Manage the MSC1000G

Use any of the following methods to manage the MSC1000G.

- Web Configurator. This is GUI-based management using a (supported) web browser. See Chapter 3 on page 65.
- Command Line Interface. Use line commands through Telnet or the console port to manage the MSC1000G. See Chapter 17 on page 309.
- Editable plain text based configuration file
- FTP for firmware upgrades and configuration backup/restore (Chapter 33 on page 585).
- SNMP. The device can be monitored by an SNMP manager. See Chapter 15 on page 287 and Section 31.4 on page 572.
- EMS (Element Management System) support. The device can be remotely managed using a Network Management System (NMS) such as Castlerock.

1.3 Good Habits for Managing the MSC1000G

Do the following things regularly to make the MSC1000G more secure and to manage the MSC1000G more effectively.

- Change the password. Use a password that's not easy to guess and that consists of different types of characters, such as numbers and letters.
- Write down the password and put it in a safe place.
- Back up the configuration (and make sure you know how to restore it). Restoring an earlier working configuration may be useful if the device becomes unstable or even crashes. If you forget your password, you will have to reset the MSC1000G to its factory default settings. If you backed up an earlier configuration file, you would not have to totally re-configure the MSC1000G. You could simply restore your last configuration.

1.4 Features

This section introduces key IES-5000 series features.

Management Switch Card Redundancy

You can install two management switch cards in the IES-5000 to increase system reliability. The two management switch cards must have the same types of uplink and subtending connections. One management switch card is active and the other acts as a standby.

The first management switch card installed is active. If both management switch cards are installed at the same time, the management switch card in the lower numbered slot is active. Whenever the active management switch card cannot operate (whether it is removed, restarts or crashes), the standby management switch card becomes active.

Gigabit Ethernet Ports

The Gigabit Ethernet ports allow the switch to connect to another WAN switch or daisy-chain to other switches.

SFP Slots

Install SFP (Small Form-factor Pluggable) transceivers in these slots to connect to other Ethernet switches at longer distances than the Ethernet port.

Console Port

Use the console port for local management.

DHCP Relay

DHCP (Dynamic Host Configuration Protocol RFC 2131 and RFC 2132) allows individual computers to obtain TCP/IP configuration at start-up from a server. You can configure the system as a DHCP relay agent to have another DHCP server provide TCP/IP configuration for the clients. In addition, you can set the system to forward client DHCP requests to specific DHCP servers based on the VLAN ID. You can also specify up to two DHCP servers for each VLAN to provide fail-over protection.

DHCP Relay Option82

The system supports DHCP relay agent82 (RFC 3046) that adds additional information to client DHCP requests that the MSC1000G relays to a DHCP server. It also supports adding the sub-option 2 (Remote ID) with additional information.

DHCP Snooping

DHCP snooping allows the system to identify packets with DHCP server assigned IP address(es) and block access of devices using unknown IP addresses on a subscriber port. You can also manually add static IP addresses to the DHCP snooping table.

Anti-IP Address Spoofing

With DHCP snooping, a line card records which IP address is assigned to each DHCP client MAC address and the VLAN to which each IP and MAC address pair belongs. The line card drops packets from a device using an IP address that is assigned to a different MAC address.

Downstream Broadcast Blocking

The system can block downstream broadcast packets from being sent to specified VLANs on specified ports.

Cluster Management

Cluster management allows you to access the web configurators and CLIs of multiple DSLAMs through one DSLAM, called the cluster manager. The IESs must be directly connected and be in the same VLAN group so as to be able to communicate with one another.

Queuing

Queuing is used to help solve performance degradation when there is network congestion. Two scheduling services are supported: Strict Priority Queuing (SPQ) and Weighted Round Robin (WRR) Queuing. This allows the MSC1000G to maintain separate queues for packets from each individual source or flow and prevent a source from monopolizing the bandwidth.

Trunking

The management switch card can trunk (aggregate port links into one logical link) Gigabit Ethernet interfaces.

Isolation (per-VLAN)

Use isolation to block the DSL subscribers in a specific VLAN from sending traffic directly to each other. The DSL subscribers can only send and receive traffic to and from the ports that are set to uplink mode. The Integrated Ethernet Switch blocks access between the DSL ports.

Link Aggregation Control Protocol (LACP)

The MSC1000G supports the link aggregation IEEE 802.3ad protocol. Link aggregation (trunking) is the grouping of physical ports into one logical higher-capacity link. You may want to trunk ports if for example, it is cheaper to use multiple lower-speed links than to under-utilize a high-speed, but more costly, single-port link.

IEEE 802.1Q Tagged VLAN

Your management switch card uses the IEEE 802.1Q Tagged VLAN (Virtual Local Area Network), which allows your device to deliver tagged/untagged frames to and from its ports.

Multicast VLAN

Multicast VLAN is designed for applications (such as Media-on-Demand (MoD)) using multicast traffic across an Ethernet ring-based service provider network. Multicast VLAN allows one single multicast VLAN to be shared among different subscriber VLANs on the network. This improves bandwidth utilization by reducing multicast traffic in the subscriber VLANs and simplifies multicast group management.

Transparent LAN Service (TLS)

Use TLS (also known as VLAN stacking) to add an outer VLAN tag to the inner IEEE 802.1Q tagged frames that enter the network. By tagging the tagged frames ("double-tagged" frames), the service provider can manage up to 4,094 VLAN groups with each group containing up to 4,094 customer VLANs. This allows a service provider to provide different services based on specific VLANs, for many different customers.

PPPoA-to-PPPoE (PAE) PVC

This feature allows the system to translate PPPoA packets to PPPoE packets (and vice versa) to allow communication between CPE clients and an access concentrator (such as a BRAS) through the switch.

PPPoE Intermediate Agent Information

Similar to DHCP relay option82, you can set the system to insert line information into client PPPoE Active Discovery Initialization (PADI) packets. This allows a PPPoE termination server to identify and authenticate a PPPoE client.

IEEE 802.1p Priority

The system uses IEEE 802.1p priority to assign priority levels to individual PVCs. The system can also handle multiple IEEE 802.1p priority queues on a single PVC.

Classifier and Policy

You can create a policy to define actions to be performed on a traffic flow grouped by a classifier according to specific criteria such as the IP address, port number or protocol type, and so on.

IEEE 802.1x Port-based Authentication

Your MSC1000G supports the IEEE 802.1x standard for centralized user authentication through an optional network authentication (RADIUS) server.

Spanning Tree Protocol (STP)/ Rapid STP (RSTP)/ Multiple STP (MSTP)

(R)STP detects and breaks network loops and provides backup links between switches, bridges or routers. It allows a switch to interact with other (R)STP -compliant switches in your network to ensure that only one path exists between any two stations on the network.

MSTP is backward compatible with (R)STP and allows you to configure multiple spanning trees for one or more VLANs and still have a loop-free network topology.

MAC (Media Access Control) Filters

Use the MAC filter to filter incoming frames based on MAC (Media Access Control) address(es) or the OUI (Organizational Unit Identifier) that you specify. You may enable/disable the MAC filter on specific ports. You may specify up to ten MAC addresses per port.

MAC (Media Access Control) Count Limit

You can limit the number of MAC addresses that may be dynamically learned on a port. You may enable/disable the MAC count limit on individual ports.

IGMP Count Limit

You can limit the number of IGMP groups a subscriber on a port can join. You may enable/disable the IGMP count limit on individual ports.

Static Multicast

Use static multicast to allow incoming frames based on multicast MAC address(es) that you specify. This feature can be used in conjunction with IGMP snooping to allow multicast MAC address(es) that are not learned by IGMP snooping. You can use static multicast to pass routing protocols, such as RIP and OSPF.

IGMP Snooping

With IGMP snooping, group multicast traffic is only forwarded to ports that are members of that group. IGMP snooping generates no additional network traffic, allowing you to significantly reduce multicast traffic passing through your IES-5000.

IGMP Proxy

The IES-5000 can act as an IGMP proxy device to reduce multicast traffic. It issues IGMP host messages to a multicast router or server on behalf of the connected multicast hosts.

Broadcast Storm Control

Broadcast storm control limits the number of broadcast packets the management switch card receives per second on its ports.

Secured Client

Configure up to four rules to allow up to four ranges of remote host IP addresses to access your management switch card.

Profile Server

The profile server feature allows you to manage profiles on multiple IES-5000s.

System Error Logging

The system error log will record error logs locally to the management switch card memory.

Configurable Alarms

The system allows you to customize the priority levels of individual alarms and the alarm severity threshold for recording alarms on an individual port(s).

Multiple Management Logins

The management switch card can support multiple concurrent management sessions.

Remote Firmware Upgrade

You can use FTP or SFTP to perform configuration backup/restore and firmware upgrade from a remote location.

Security

- Password protection for system management
- VLAN
- RADIUS client
- TACACS+ client

Alarm LED

An **ALM** (alarm) LED lights when the second power source is not connected, the IES-5000 is overheated, the voltage readings are outside the tolerance levels a fan fails or another alarm with a severity level of MAJOR or CRITICAL occurs.

Flow Control

The management switch card uses IEEE 802.3 flow control to manage the sending of traffic so the sending device does not transmit more than the receiving device can process. This helps prevent traffic from being dropped and having to be resent.

Quality of Service

The MSC1000G has eight priority queues so you can ensure mission-critical data gets delivered on time.

Multiple PVC and ATM QoS

The IES-5000 allows you to use different channels (also called Permanent Virtual Circuits or PVCs) for different services or subscribers. Define channels on each DSL port for different services or levels of service and assign each channel a priority. ATM Quality of Service (QoS) allows you to regulate the average rate and fluctuations of data transmission. This helps eliminate congestion to allow the transmission of real time data (such as audio and video).

Priority-based PVCs

The system provides Priority-based PVCs (PPVCs) to give different priorities to PVCs that are members of the same VLAN. Use up to eight priority queues for the member PVCs. The system maps frames with certain IEEE 802.1p priorities to a PVC with a particular priority queue.

DSCP-to-IEEE 802.1p Priority Mapping

DiffServ is a class of service (CoS) model that marks packets with DiffServ Code Points (DSCP) so that they receive specific per-hop treatment at DiffServ-compliant network devices along the route. You can configure DSCP-to-IEEE 802.1p mappings to allow the MSC1000G to prioritize all incoming traffic based on the DSCP value according to the mapping table.

System Monitoring

- System status (link status, rates, statistics counters)
- Temperatures, voltage reports and alarms.

Bandwidth Control

The MSC1000G supports rate limiting in 1 Mbps increments on the individual Gigabit Ethernet interfaces allowing you to limit backbone bandwidth usage. You can also apply bandwidth control on multicast traffic.

IP-aware Bridging

The line cards can forward frames based on the destination IP address, instead of the destination MAC address, and replace the source MAC address with its own MAC address. This provides better scalability and security for large-scale access networks, especially with Ethernet.

Single End Loop Test (SELT)

This feature checks the distance to an ADSL subscriber's location.

Dual End Loop Test (DELT)

This feature (also called a Loop Diagnostic Mode test or LDM test) provides details about the condition of an ADSL subscriber's line.

2

Hardware Connections

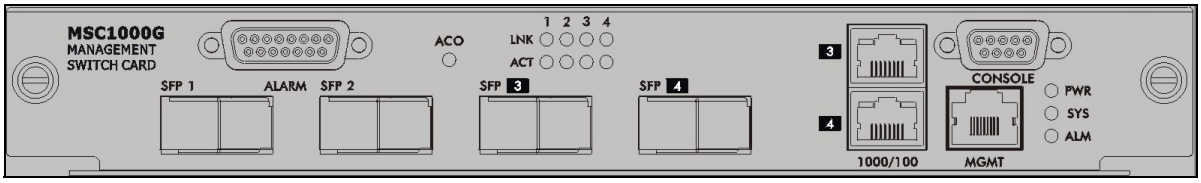
This chapter introduces the MSC1000G's hardware and how to connect it.

Refer to the Integrated Ethernet Switch's User's Guide for directions and safety warnings on installing the management switch card.

Use this chapter's port and slot descriptions to connect the management switch card.

2.1 Front Panel

Figure 3 MSC1000G Front Panel



2.2 LEDs

Table 1 Management Switch Card LED Descriptions

LED	COLOR	STATUS	DESCRIPTION
PWR	Green	On	The management switch card is installed and receiving power from the main chassis.
		Off	The management switch card is not receiving power from the main chassis.
ALM	Red	On	An alarm has been detected on the MSC1000G, the Integrated Ethernet Switch fan or the **INPUT ALARM** terminals. Examples of an alarm on the MSC1000G are when the MSC1000G's voltage or temperature is outside of the normal range.
		Off	The MSC1000G has not detected an alarm on itself, the Integrated Ethernet Switch fan or the **INPUT ALARM** terminals.

Table 1 Management Switch Card LED Descriptions

LED	COLOR	STATUS	DESCRIPTION
SYS	Green	Blinking	The system is initializing.
		On	The management switch card is on and functioning properly.
		Off	The management switch card is not receiving power, is not ready or has malfunctioned.
1000/100	Yellow	Blinking	The port is transmitting/receiving to/from a 100 Mbps Ethernet network.
		On	A 100 Mbps Ethernet link is up.
		Off	The Ethernet link is down.
	Green	Blinking	The port is transmitting/receiving to/from a 1000 (1 Gbps) Mbps Ethernet device.
		On	A 1000 Mbps (1 Gbps) Ethernet link is up.
		Off	The Ethernet link is down.
MGMT	Yellow	Blinking	The port is transmitting/receiving to/from a 100 Mbps Ethernet network.
		On	A 100 Mbps Ethernet link is up.
		Off	The Ethernet link is down.
	Green	Blinking	The port is transmitting/receiving to/from a 10 Mbps Ethernet device.
		On	A 10 Mbps Ethernet link is up.
		Off	The Ethernet link is down.
The following LEDs apply to the SFP slots.			
LNK 1~4	Green	On	A 1000 Mbps (1 Gbps) Ethernet link is up.
		Off	The Ethernet link is down.
ACT 1~4	Green	Blinking	The system is transmitting/receiving Ethernet traffic.
		Off	The system is not transmitting/receiving Ethernet traffic.

2.3 Ports and Connections

Install the MSC1000G before you make the hardware connections. Refer to the IES-5000 User's Guide for installation instructions.

Table 2 Front Panel Descriptions

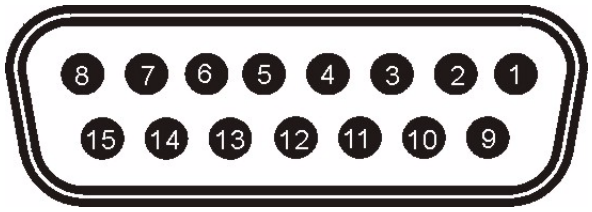
LABEL	DESCRIPTION
ALARM	This DB15F connector is for connecting to alarm input and alarm output terminals on other pieces of equipment.
ACO	Press this Alarm Cut Off Button to cancel an alarm. This stops the sending of the alarm signal current. This is useful in stopping an alarm if you have the alarm output connector pins connected to a visible or audible alarm. The alarm entry remains in the system.

Table 2 Front Panel Descriptions (continued)

LABEL	DESCRIPTION
1000/100	The management switch card uses one or two uplink ports for connecting to an Ethernet switch(es) that is part of a high-bandwidth backbone network. This is an electrical Ethernet interface for use with the following copper Ethernet cables: a). 100Base-Tx 2 pair UTP Cat. 5, up to 100m b). 1000Base-T 4-pair UTP Cat. 5, up to 100m Connector: RJ-45 For better performance and lower radiation noise, use shielded Ethernet cables.
SFP	These are slots for SFP transceivers.
MGMT	This is an RJ-45 Ethernet port for connecting to an Ethernet network for out-of-band management (a separate channel for management that is not part of the channels that are usually used for data transfer).
CONSOLE	This DB-9 RS-232 port is for connecting to a computer for local management.

2.3.1 Alarm Connections

Figure 4 ALARM Connector Pin Layout



A closed circuit on the **ALARM** input pins indicates an alarm.

- Pins 1 and 9 are alarm input one.
- Pins 2 and 10 are alarm input two.
- Pins 3 and 11 are alarm input three.

The MSC1000G signals an alarm when it detects an alarm on the **ALARM** input pins, the IES-5000 is overheated, the voltage readings are outside the tolerance levels a fan fails or another alarm occurs.

To signal a minor alarm, the MSC1000G opens the circuit for pins 4 and 12 and closes the circuit for pins 5 and 12.

To signal a major alarm, the MSC1000G opens the circuit for pins 13 and 6 and closes the circuit for pins 14 and 6.

To signal a critical alarm, the MSC1000G opens the circuit for pins 7 and 15 and closes the circuit for pins 8 and 15.

Examples of an alarm on the MSC1000G are when the MSC1000G's voltage or temperature is outside of the normal range.

2.3.2 Gigabit Ethernet Interfaces

There are two Gigabit Ethernet SFP slots and two Gigabit Ethernet port/SFP slot pairs. The SFP slots have priority over the Gigabit ports. This means that if a SFP transceiver and the corresponding Gigabit port are connected at the same time, the Gigabit port will be disabled.

The Ethernet ports are auto-negotiating and can detect and adjust to the optimum Ethernet speed (100/1000 Mpbs) and duplex mode (full duplex or half duplex) of the connected device.

The Ethernet ports are also auto-crossover (auto-MDI/MDI-X), they automatically work with a straight-through or crossover Ethernet cable.

2.3.2.1 Uplink and Subtending

SFP slots 1 and 2 are subtending ports. The Gigabit Ethernet port/SFP slot pairs labeled 3 and 4 are uplink ports.

The Gigabit Ethernet SFP slots and ports can function in either subtending or uplink mode. Connect a port in uplink mode to an backbone Ethernet switch or router. The management switch card allows traffic between the ports in uplink mode and the DSL ports on the line cards.

Use the subtending mode to daisy-chain other Ethernet switches. With subtending mode, the management switch card allows traffic between the ports in subtending mode and the ports in uplink mode. The management switch card does not allow traffic between the ports in subtending mode and the DSL ports on the line cards.

See Section 30.9.9 on page 548 to change the mode of a Gigabit Ethernet port.

2.3.3 SFP Slots

These are slots for SFP transceivers. A transceiver is a single unit that houses a transmitter and a receiver. The switch does not come with transceivers. You must use transceivers that comply with the SFP Transceiver MultiSource Agreement (MSA). See the SFF committee's INF-8074i specification Rev 1.0 for details.

SFP slots 1 and 2 are separate interfaces.

SFP slots 3 and 4 are combined with Gigabit Ethernet ports 3 and 4 respectively. The SFP ports have priority over the Gigabit ports. This means that if a SFP transceiver and the corresponding Gigabit port are connected at the same time, the Gigabit port will be disabled.

You can change transceivers while the MSC1000G is operating. You can use different transceivers to connect to Ethernet switches with different types of fiber-optic connectors.

- Type: SFP connection interface
- Connection speed: 1 Gigabit per second (Gbps)

To avoid possible eye injury, do not look into an operating fiber-optic module's connectors.

2.3.3.1 Transceiver Installation

Use the following steps to install a mini GBIC transceiver (SFP module) in a slot.

The slot is at an angle. Do not attempt to straighten it.

1. Remove the dust cover from the transceiver.
2. For transceivers with a flip-up or flip-down latch, close the latch.
3. Insert the fiber-optic cables into the transceiver (you may need to remove cable dust covers).
4. Insert the transceiver into the slot with the exposed section of PCB board facing down.
5. Press the transceiver firmly until it clicks into place.

Figure 5 Transceiver Installation

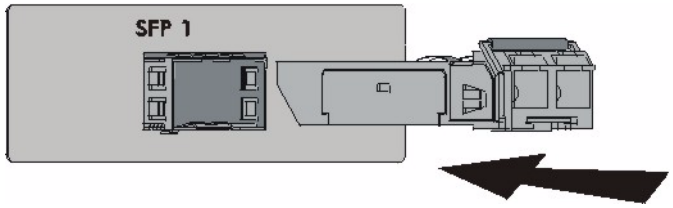
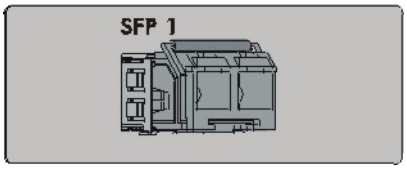


Figure 6 Installed Transceiver



2.3.3.2 Transceiver Removal

Use the following steps to remove a mini GBIC transceiver (SFP module) from the slot.

1. Remove the fiber-optic cables from the transceiver.
2. Unlock the transceiver's latch (latch styles vary).
3. Pull the transceiver out of the slot.
4. Put the transceiver's dust cover on the transceiver.

Figure 7 Opening the Transceiver Latch

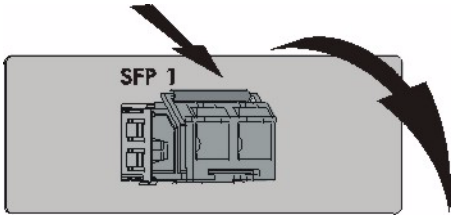
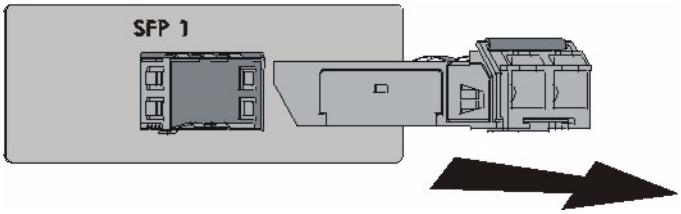


Figure 8 Removing the Transceiver



Console Port

Use the console port for local management of the MSC1000G.

PART II
Web Configurator

The Web Configurator (65)
Initial Setup Example (75)
Access Control List Screens (81)
Alarm Screens (111)
Cluster Screens (125)
Diagnostic Screens (131)
Maintenance Screens (137)
Multicast Screens (141)
DSL Port Setup Screens (151)
Profile Screens (205)
Statistics Screens (227)
Switch Screens (263)
Sys Screens (287)
VLAN Screens (299)

3

The Web Configurator

This section introduces the configuration and functions of the web configurator.

3.1 Web Configurator Introduction

The web configurator is an HTML-based management interface that allows easy switch setup and management via Internet browser. Use Internet Explorer 6.0 and later or Netscape Navigator 7.0 and later versions. The recommended screen resolution is 1024 by 768 pixels.

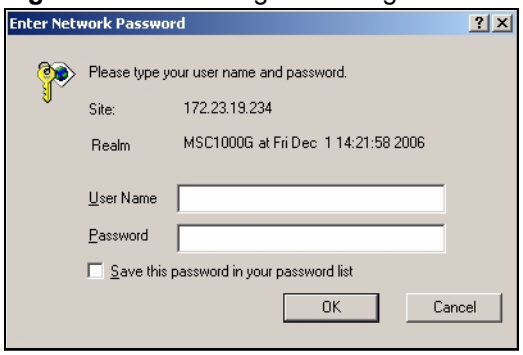
In order to use the web configurator you need to allow:

- Web browser pop-up windows from your device. Web pop-up blocking is enabled by default in Windows XP SP (Service Pack) 2.
- JavaScript (enabled by default).
- Java permissions (enabled by default).

3.2 System Login

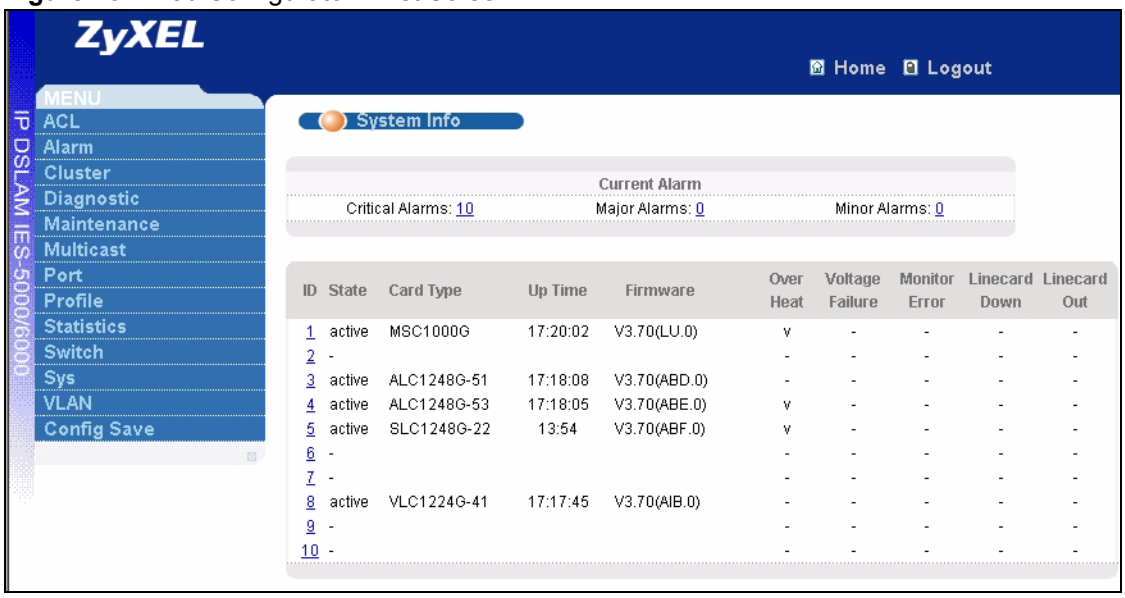
1. Start your web browser.
2. Type "http://" and the IP address of the switch in the **Location** or **Address** field. Press [ENTER]. 192.168.1.1 is the default in-band management IP address and 192.168.0.1 is the default out-of-band (management port) IP address.
3. The login screen appears. The default username is **admin** and associated default password is **1234**. The date and time display as shown if you have not configured a time server nor manually entered a time and date in the **General Setup** screen.

Figure 9 Web Configurator: Login



4 Click **OK** to view the first web configurator screen.

Figure 10 Web Configurator: First Screen


ZyXEL
Home
Logout
IP DSLAM IES-5000/6000
MENU
ACL
Alarm
Cluster
Diagnostic
Maintenance
Multicast
Port
Profile
Statistics
Switch
Sys
VLAN
Config Save
System Info
Current Alarm
Critical Alarms: 10
Major Alarms: 0
Minor Alarms: 0
ID State Card Type Up Time Firmware Over Heat Voltage Failure Monitor Error Linecard Down Linecard Out
1 active MSC1000G 17:20:02 V3.70(LU.0) v - - - -
2 - - - - - - -
3 active ALC1248G-51 17:18:08 V3.70(ABD.0) - - - - -
4 active ALC1248G-53 17:18:05 V3.70(ABE.0) v - - - -
5 active SLC1248G-22 13:54 V3.70(ABF.0) v - - - -
6 - - - - - - -
7 - - - - - - -
8 active VLC1224G-41 17:17:45 V3.70(AIB.0) - - - - -
9 - - - - - - -
10 - - - - - - -

3.3 Navigation Panel

In the navigation panel (the column on the left), click a main link to reveal a list of submenu links. The following table describes the links in the navigation panel.

Table 3 Navigation Panel Links

LINK	DESCRIPTION
ACL	
DHCP Relay	This link takes you to a screen where you can configure DHCP relay information and specify the DHCP server(s).
DHCP Snoop	This link takes you to screens where you can activate DHCP snooping and configure static client IP addresses on a port.
Downstream Broadcast	This link takes you to a screen where you can block downstream broadcast packets from being sent to specified VLANs on specified ports.
MAC Count	This link takes you to a screen where you can limit the number of MAC addresses that can connect to a subscriber port.
MAC Filter	This link takes you to a screen where you can allow only traffic from specified source MAC addresses on the specified subscriber ports.
OUI Filter	This link takes you to a screen where you can allow only traffic from MAC addresses with the specified OUI on the specified subscriber ports.
Packet Filter	This link takes you to a screen where you can allow or drop specified packet types on the specified subscriber ports.
802.1X PNAC	This link takes you to a screen where you can configure RADIUS (Remote Authentication Dial-In User Service) and IEEE 802.1x authentication settings.
Alarm	
Current Alarm	This link takes you to a screen where you can display current detailed alarms by severity or time period.

Table 3 Navigation Panel Links (continued)

LINK	DESCRIPTION
History Alarm	This link takes you to a screen where you can display historical alarms by severity or time period.
Alarm Port Setup	This link takes you to a screen where you can set the severity level of alarms to record on specified ports.
Alarm Severity Assignment	This link takes you to a screen where you where you can configure the log facility, message type and severity of the alarm categories.
Alarm Clear	This link takes you to a screen where you can erase alarm entries.
Cluster	
Cluster Status	This link takes you to a screen where you can view clustering status
Cluster Configuration	This link takes you to a screen where you can configure clustering management.
Diagnostic	
LDM	This link takes you to a screen where you can perform LDM (Loop Diagnostic Mode) tests on a subscriber port.
Loopback	This link takes you to a screen where you can perform an OAMF5 loopback test on a subscriber port or PVC.
IP Ping	This link takes you to a screen where you can ping a host.
IP Trace Route	This link takes you to a screen where you can send a traceroute packet to an IP address and use the response to determine the path a packet takes to that IP address.
Maintenance	
Config Backup	This link takes you to a screen where you can back up your current system configuration.
Config Restore	This link takes you to a screen where you can restore a previously saved configuration.
Config Reset	This link takes you to a screen where you can reset the system back to the factory defaults.
Firmware Upgrade	This link takes you to a screen where you can upload a new firmware.
Reboot	This link takes you to a screen where you can restart the system.
Multicast	
IGMP	This link takes you to screens where you can enable or disable IGMP proxy or IGMP snooping and assign IGMP filter profiles to subscriber ports.
Static Multicast	This link takes you to a screen where you can configure static multicast group entries.
Port	
ADSL	This link takes you to screens where you can configure the ADSL ports.
VDSL	This link takes you to screens where you can configure the VDSL ports.
SHDSL	This link takes you to screens where you can configure the SHDSL ports.
PVC	This link takes you to screens where you can configure PVCs (Permanent Virtual Circuits) on subscriber ports.
PPVC	This link takes you to screens where you can configure Priority PVCs on subscriber ports.

Table 3 Navigation Panel Links (continued)

LINK	DESCRIPTION
IP Bridge	This link takes you to a screen where you can configure IP-aware bridging, where the MSC1000G forwards packets based on destination IP address instead of destination MAC address.
Copy	This link takes you to a screen where you can copy port settings from a source port to destination ports on the same type of line card.
Profile	
ADSL	This link takes you to a screen where you can configure ADSL profiles.
VDSL	This link takes you to a screen where you can configure VDSL profiles.
SHDSL	This link takes you to a screen where you can configure SHDSL profiles.
ATM	This link takes you to a screen where you can configure ATM traffic profiles.
Alarm ADSL	This link takes you to a screen where you can configure ADSL alarm profiles.
Alarm VDSL	This link takes you to a screen where you can configure VDSL alarm profiles.
Alarm SHDSL	This link takes you to a screen where you can configure SHDSL alarm profiles.
IGMP Filter	This link takes you to a screen where you can configure IGMP filter profiles
Statistics	
ARP Table	This link takes you to a screen where you can view the MAC address to IP address resolution table.
DHCP	This link takes you to a screen where you can view DHCP counters and DHCP snooping information.
MAC Table	This link takes you to a screen where you can see the MAC addresses that the system has dynamically learned.
IGMP Status	This link takes you to a screen where you can view information collected by IGMP snooping and/or IGMP proxy.
IP Bridge	This link takes you to a screen where you can view IP bridge information.
Online Users	This link takes you to a screen where you can view information about administrators that are logged into the system.
Port Statistics	This link takes you to screens where you can view port statistics and status. You can also view RMON history information on the switch ports.
Dot3ad	This link takes you to a screen where you can view the link aggregation status.
VLAN	This link takes you to screens where you can view the VLAN settings and status.
MSTP	This link takes you to screens where you can view the MSTP status and statistics.
IP	This link takes you to a screen where you can view the port IP statistics.
Switch	
Switch Setup	This link takes you to a screen where you can set up global switch parameters such as GARP, link aggregation, priority queues and a port's queuing method.
MSTP	This link takes you to a screen where you can configure spanning tree settings to prevent network loops.
Switch Port Setup	This link takes you to a screen where you can configure settings for individual Gigabit Ethernet interfaces.
Sys	
Access Control	This link takes you to screens where you can configure SNMP and remote management.
General Setup	This link takes you to a screen where you can configure general identification information about the switch and the time and date settings.

Table 3 Navigation Panel Links (continued)

LINK	DESCRIPTION
IP Setup	This link takes you to a screen where you can configure the in-band and out-of-band management IP addresses and subnet masks.
Unix SysLog	This link takes you to a screen where you can configure the syslog settings.
User Account	This link takes you to screens where you can configure a user account and its level of access privileges and authentication settings.
VLAN	
VLAN	This link takes you to screens where you can configure static VLANs.
Port Setting	This link takes you to screens where you can configure port VLAN settings.
Config Save	
Config Save	This link takes you to a screen where you can save the device's configuration into the nonvolatile memory (the system's storage that remains even if the power is turned off).

The following table lists the various web configurator screens within the sub-links.

Table 4 Web Configurator Screen Sub-links Details

ACL	**Alarm**	**Cluster**	**Diagnostic**
DHCP Relay	Current Alarm	Cluster Status	LDM
DHCP Snoop	Critical	Cluster Status - Member	Loopback
DHCP Snoop Slot	Major	Cluster Configuration	IP Ping
Downstream Broadcast	Minor		IP Trace Route
Downstream Broadcast Slot	All		
MAC Count	History Alarm		
MAC Count Slot	Critical		
MAC Filter	Major		
MAC Filter Slot	Minor		
OUI Filter	All		
OUI Filter Slot	Alarm Port Setup		
Packet Filter	Alarm Port Setup Slot		
Packet Filter Slot	Alarm Severity Assignment		
802.1X PNAC	DSL		
Port Setup	Equipment		
802.1X PNAC Slot	System		
RADIUS	Ethernet		
	Alarm Clear		

Table 4 Web Configurator Screen Sub-links Details (continued)

Maintenance	**Multicast**	**Port**	**Profile**
Config Backup Config Restore Config Reset Firmware Upgrade Reboot	IGMP IGMP Setup Filter Setup IGMP Slot Static Multicast	ADSL ADSL Port Setup ADSL Port Setup Slot ADSL Port Setup Advanced VDSL VDSL Port Setup VDSL Port Setup Slot VDSL Port Setup Advanced SHDSL SHDSL Port Setup SHDSL Port Setup Slot SHDSL Port Setup Advanced PVC PVC Setup Slot PVC Setup VLAN PPVC PPVC Setup Slot PPVC Setup VLAN IP Bridge ARP Proxy Domain Edgerouter Interface IPBPVC IPBPVC Slot Route Copy	ADSL VDSL SHDSL ATM Alarm ADSL Alarm VDSL Alarm SHDSL IGMP Filter
Statistics	**Switch**	**Sys**	**VLAN**
ARP Table DHCP MAC Table IGMP Status Status Port IP Bridge ARP Proxy Interface Route Online Users Port Statistics Counter Slot Packet Counter Dot3ad VLAN VLAN Detail MSTP CIST CIST Detail MSTI IP	Switch Setup General Dot3ad QSchedule Isolation MSTP Bridge Port Switch Port Setup Port 802.1P/1Q Bandwidth Broadcast	Access Control SNMP Access Ctrl Secured Client General Setup IP Setup Unix SysLog User Account User Account Authentication	VLAN Port Setting VLAN Slot VLAN Detail
Config Save Config Save			

3.4 Saving Your Configuration

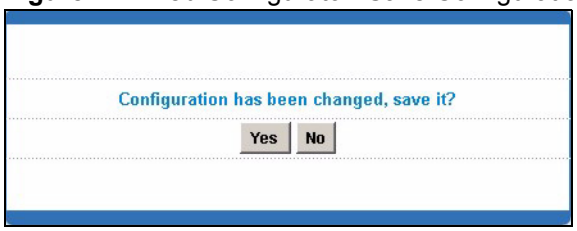
Click **Apply** in a configuration screen when you are done modifying the settings in that screen to save your changes back to the run time memory and to make your changes take effect.

Click **Config Save** in the navigation panel and then the **Save** button to save your configuration to nonvolatile memory. Nonvolatile memory refers to the switch's storage that remains even if the switch's power is turned off.

Use **Config Save** when you are done with a configuration session.

If you log out of the web configurator without saving configuration changes, a screen displays as shown. Click **Yes** to save the changes or click **No** if you do not want to save the changes. Unsaved changes are lost when the switch's power is turned off.

Figure 11 Web Configurator: Save Configuration on Logout



3.5 Logging Out of the Web Configurator

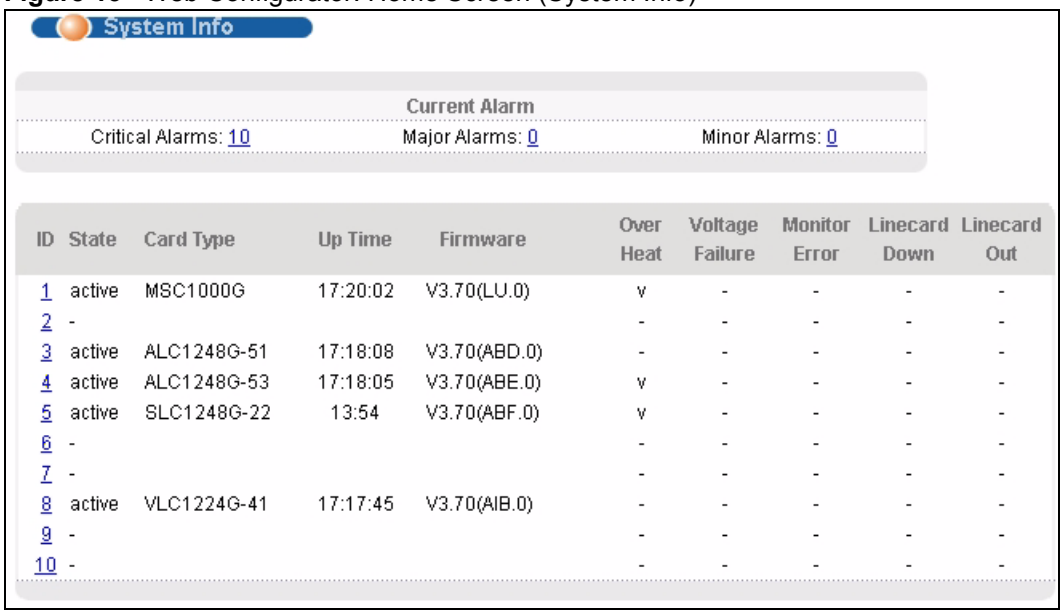
Click **Logout** in a screen to exit the web configurator. You have to log in with your password again after you log out. This is recommended after you finish a management session both for security reasons and so as you don't lock out other switch administrators.

Figure 12 Web Configurator: Logout Screen

3.6 System Info

The **System Info** screen is the first screen that displays when you access the web configurator.

Figure 13 Web Configurator: Home Screen (System Info)


System Info
Current Alarm
Critical Alarms: 10
Major Alarms: 0
Minor Alarms: 0
ID State Card Type Up Time Firmware Over Heat Voltage Failure Monitor Error Linecard Down Linecard Out
1 active MSC1000G 17:20:02 V3.70(LU.0) v - - - -
2 - - - - - - -
3 active ALC1248G-51 17:18:08 V3.70(ABD.0) - - - - -
4 active ALC1248G-53 17:18:05 V3.70(ABE.0) v - - - -
5 active SLC1248G-22 13:54 V3.70(ABF.0) v - - - -
6 - - - - - - -
7 - - - - - - -
8 active VLC1224G-41 17:17:45 V3.70(AIB.0) - - - - -
9 - - - - - - -
10 - - - - - - -

The following table describes the labels in this screen.

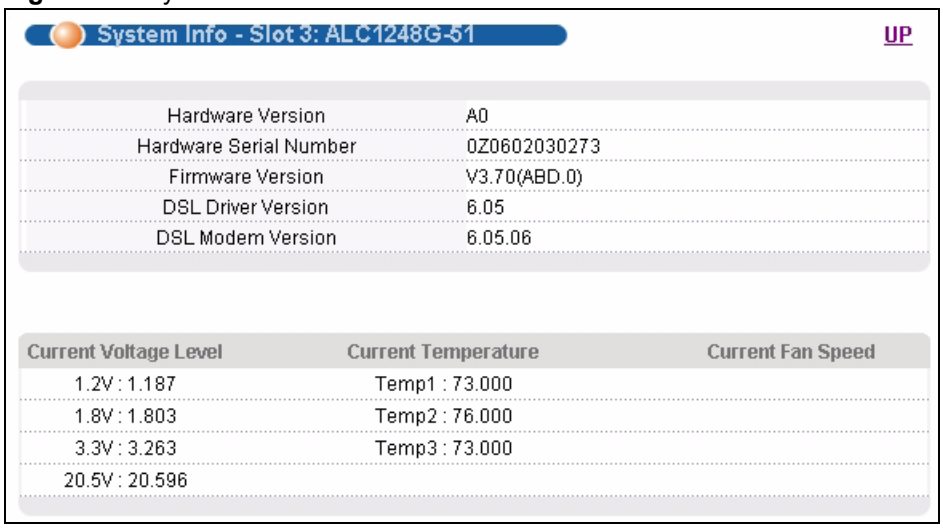
Table 5 System Info (Home)

LABEL	DESCRIPTION
Current Alarm	Click the links to view detailed alarm information (see Section 6.1 on page 111).
Critical Alarms	This field displays the number of critical alarms occurred. Click the link to display the **Current Alarm: Critical Alarm** screen.
Major Alarms	This field displays the number of major alarms occurred. Click the link to display the **Current Alarm: Major Alarm** screen.
Minor Alarms	This field displays the number of minor alarms occurred. Click the link to display the **Current Alarm: Minor Alarm** screen.
ID	This is the slot number of a line card. Click the index number of an active line card to display the **System Info - Slot screen to view detailed status.**
State	This field displays the line card's current operational status. **active** means the line card is operating normally. **init** means the MSC1000G is initializing the line card. **disable** means a manager has disabled the line card. **inactive** means the line card is starting up or is not operating normally. This could be due to the card starting, a firmware upgrade in progress or a malfunction. See Section 34.6 on page 598 for what to do if the line card stays stuck in the inactive state.
Card Type	This field displays the type of a line card.
Up Time	This field displays how long the line card has been running since the last time it was started.
Firmware	This field displays the current firmware version installed on the line card.
Over Heat	This field indicates whether the temperate of the line card is too high.
Voltage Failure	This field indicates whether the voltage on the line card is out of the tolerance range.
Monitor Error	This field indicates if no line card status information can be obtained.
Linecard Down	This field indicates whether the line card has failed.
Linecard Out	This field indicates whether the line card is removed from its slot.

3.6.1 Card Status Details

To view detailed card status information, click an index number of an active card in the **System Info** screen.

Figure 14 System Info: Slot



The following table describes the labels in this screen.

Table 6 System Info: Slot

LABEL	DESCRIPTION
Hardware Version	This is the version of the physical device hardware.
Hardware Serial Number	This is the individual identification number assigned to the device at the factory.
Firmware Version	This field displays the version number of the device's current firmware including the date created.
DSL Driver Version	This field displays the version number of the DSL line card's driver.
DSL Modem Version	This field displays the version number of the DSL line card's modem code.
Current Voltage Level	This field displays the current voltage readings.
Current Temperature	This field displays the current temperature at the sensors
Current Fan Speed	This field is not applicable for DSL line cards. This field displays the current fan speeds.

4

Initial Setup Example

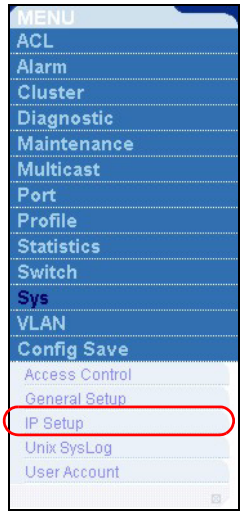
This chapter describes initial configuration for the switch.

4.1 Initial Configuration

This chapter shows what you first need to do to provide service to DSL subscribers connected to a line card.

1 Click **Sys > IP Setup**.

Figure 15 Sys: IP Setup Menu

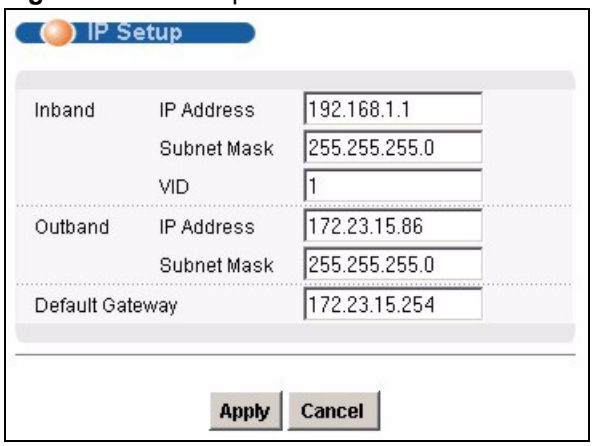


2 Use this screen to change the in-band and out-of-band management IP address and subnet mask settings. You also need to configure a default gateway IP address for the system. Apply the settings. If you change the IP address, you must use the new IP address if you want to access the web configurator again.

3 You can also change the in-band management VLAN (CPU). You can only manage the MSC1000G through ports that are members of the management VLAN.

By default, you can access the management VLAN from all of the IES-5000's in-band ports since they are all in the management VLAN. If you need more security, please see Section 24.2.9.1 on page 399 for an example of changing the management VLAN.

Figure 16 IP Setup



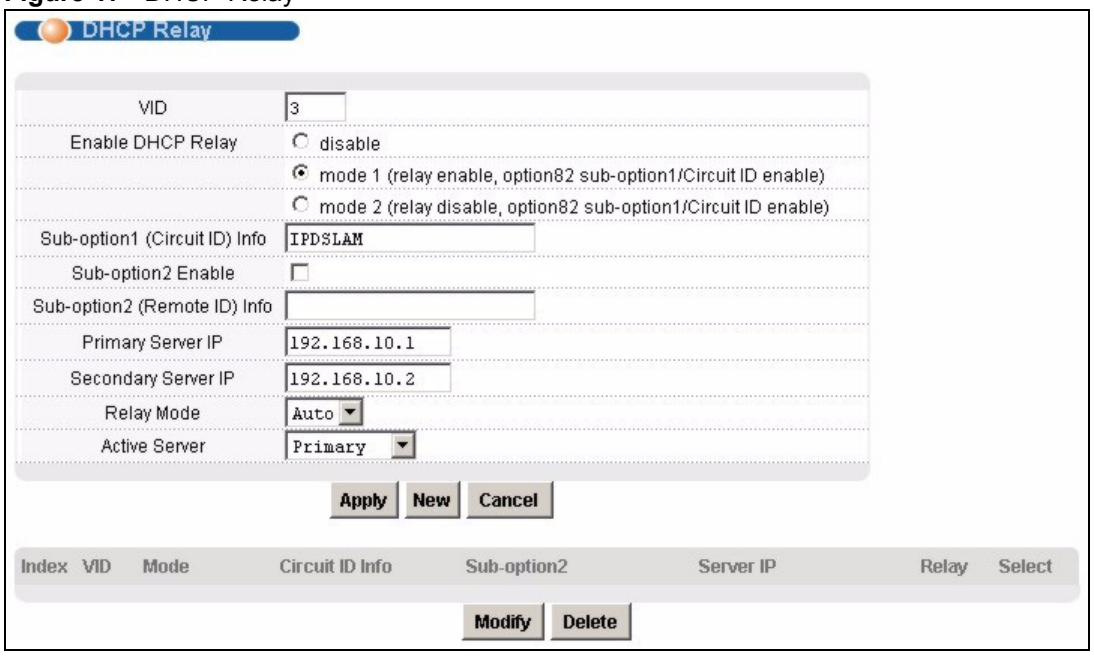
4 If you will use DHCP with the subscribers, click **ACL > DHCP Relay** to display the screen shown next.

5 Create a new DHCP relay entry for the VLAN (3 in this example). Enable DHCP relay and specify any option 82 information that you want to include when relaying the DHCP requests.

6 Configure the primary/secondary DHCP server's IP address and select which DHCP server to which the device sends DHCP request first.

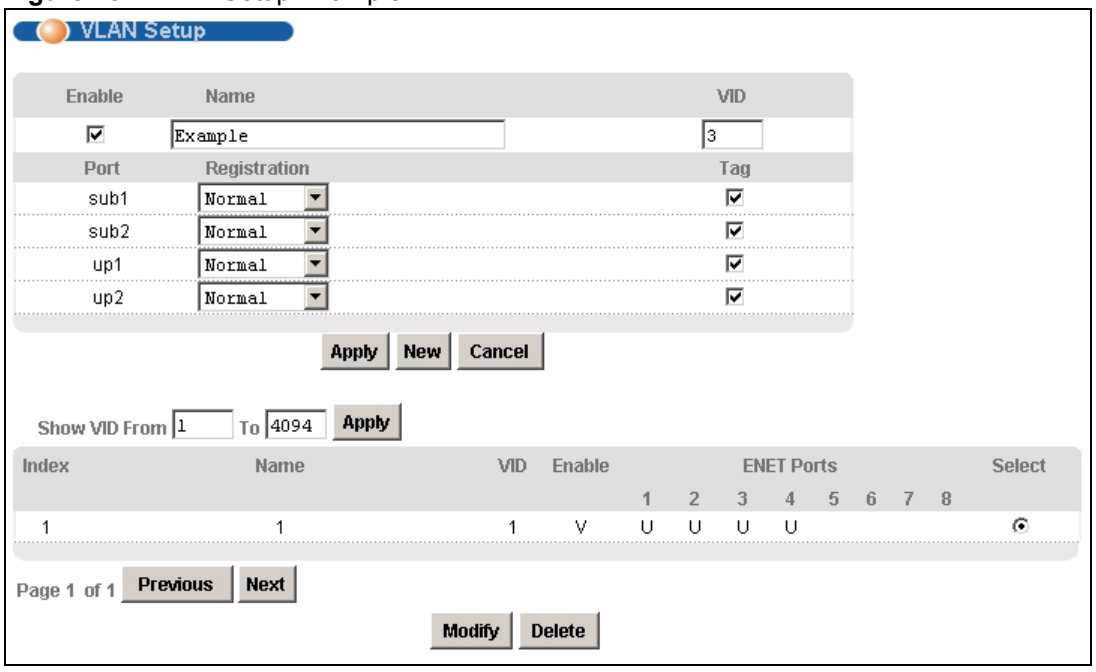
7 Click **Apply**.

Figure 17 DHCP Relay



8 Click **VLAN > VLAN** in the navigation panel to display the screen shown next. Configure VLAN 3 and make ports **Up1** and **Up2** (the uplink ports) fixed members. Click **Apply**.

Figure 18 VLAN Setup Example

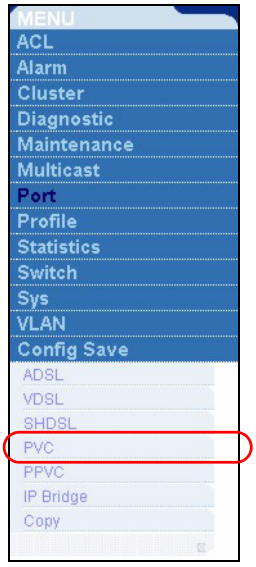


9 Use the following steps to set the VPI and VCI and PVID (default VLAN ID) settings for all of an ALC or SLC line card's DSL ports.

First you will delete the default PVC from all of the line card's DSL ports. Then you will configure a new PVC for a port and copy it to the line card's other DSL ports.

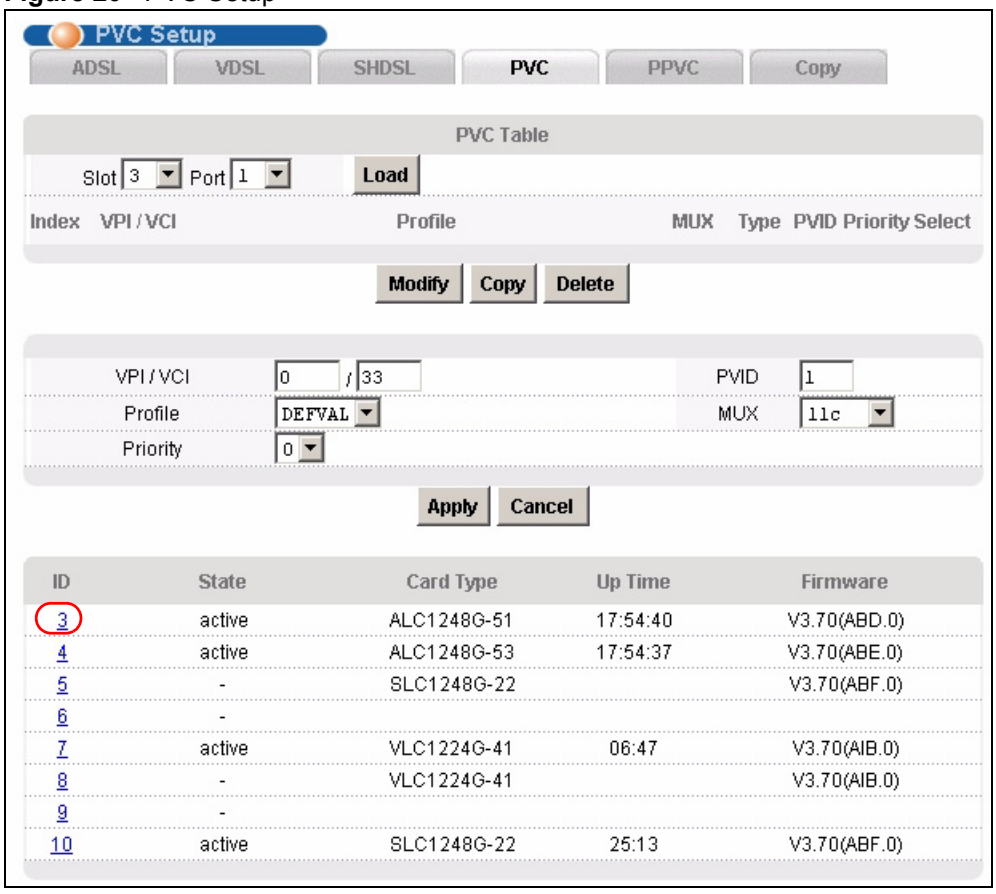
10 Under **Port**, click **PVC**.

Figure 19 Port Setup Menu



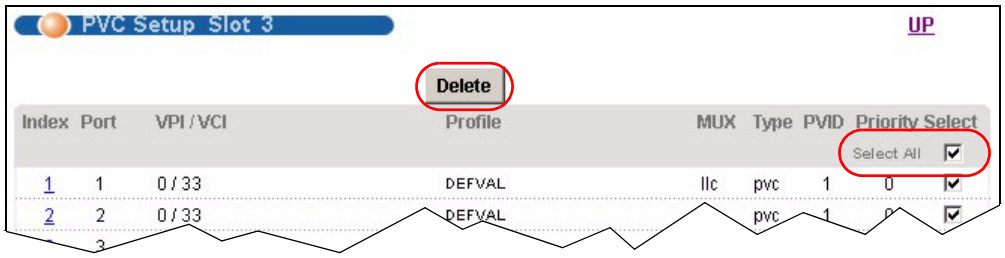
11 Click an active line card's slot number to display PVC settings for all DSL ports on the selected line card.

Figure 20 PVC Setup



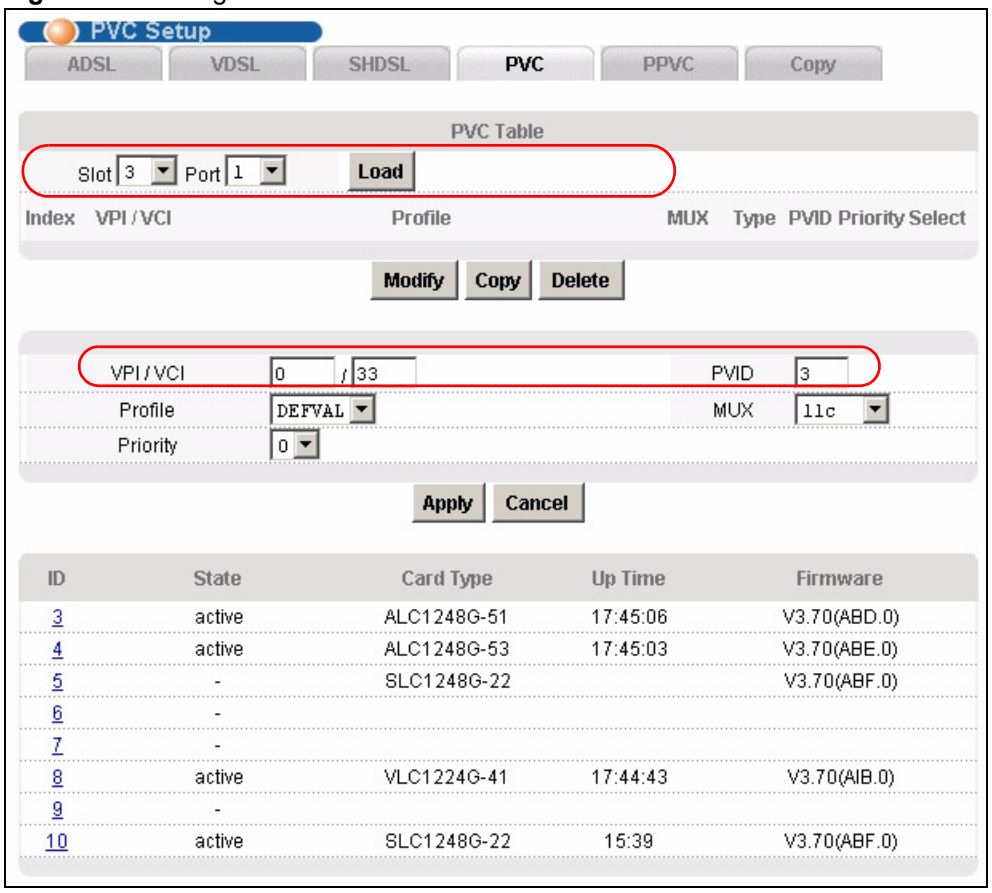
12 Select the **Select All** check box and click **Delete**. Click **UP** to go back to the previous screen.

Figure 21 Deleting PVCs


PVC Setup Slot 3
UP
Delete
Index Port VPI / VCI Profile MUX Type PVID Priority Select
Select All
1 1 0 / 33 DEFVAL llc pvc 1 0
2 2 0 / 33 DEFVAL pvc 1 0

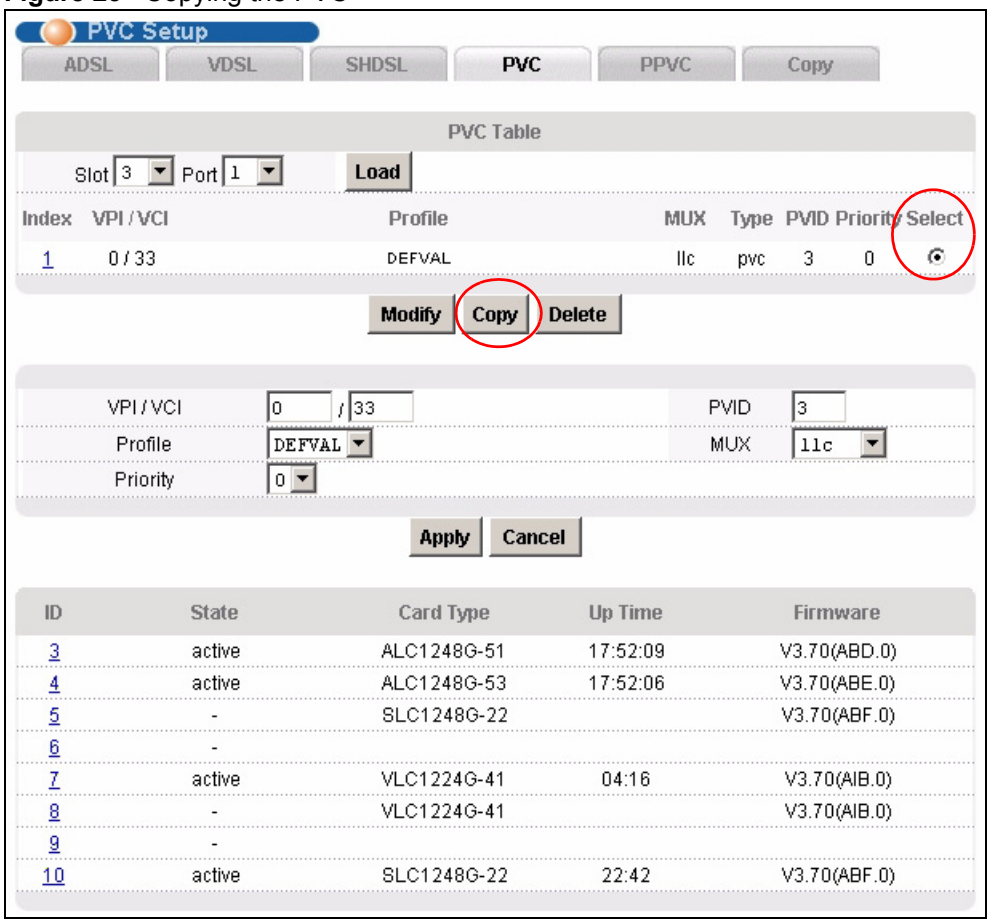
13 Select the line card and a DSL port. Enter the VPI and VCI that you need (or leave the defaults if your subscribers will use VPI 0 and VCI 33). Set the PVID to 3. Leave the other default settings and click **Apply**.

Figure 22 Adding a New Channel


PVC Setup
ADSL VDSL SHDSL PVC PPVC Copy
PVC Table
Slot 3 Port 1 Load
Index VPI / VCI Profile MUX Type PVID Priority Select
Modify Copy Delete
VPI / VCI 0 / 33 PVID 3
Profile DEFVAL MUX llc
Priority 0
Apply Cancel
ID State Card Type Up Time Firmware
3 active ALC1248G-51 17:45:06 V3.70(ABD.0)
4 active ALC1248G-53 17:45:03 V3.70(ABE.0)
5 - SLC1248G-22 V3.70(ABF.0)
6 -
7 -
8 active VLC1224G-41 17:44:43 V3.70(AIB.0)
9 -
10 active SLC1248G-22 15:39 V3.70(ABF.0)

14 Select the new channel's **Select** radio button and click **Copy**.

Figure 23 Copying the PVC

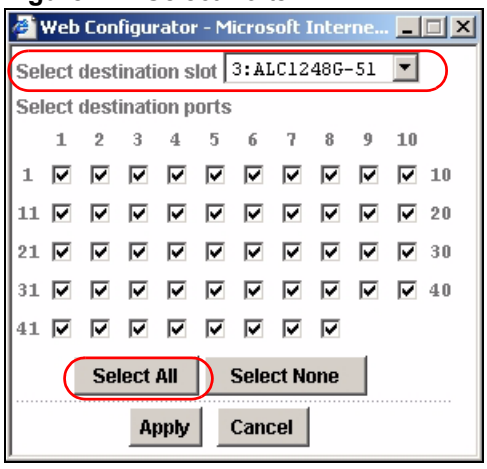


15 Select the line card.

16 Click **Select All** to select every port on the selected line card.

17 Click **Apply** to paste the settings.

Figure 24 Select Ports



You can now (with the other settings set to the defaults) provide service to DSL subscribers connected to the line card. See the appendices for information on other default settings.

5

Access Control List Screens

This chapter describes the ACL (Access Control List) screens.

5.1 DHCP Relay Overview

DHCP (Dynamic Host Configuration Protocol, RFC 2131 and RFC 2132) allows individual clients to obtain TCP/IP configuration at start-up from a DHCP server. You can configure the system to relay client TCP/IP configuration requests to a DHCP server and the server's responses back to the clients.

You can configure the system to forward client DHCP requests from different VLANs to specific DHCP servers.

5.1.1 DHCP Relay Agent Information

The system can add information to DHCP requests that it relays to a DHCP server. This helps provide authentication about the source of the requests. You can also specify additional information for the system to add to the DHCP requests that it relays to the DHCP server. Please refer to RFC 3046 for more details.

The DHCP relay agent information feature adds an Agent Information field to the option 82 field of the headers in the DHCP request frames that the switch relays to a DHCP server. The following lists the DHCP relay agent option 82 information that the switch sends to the DHCP server:

- Slot ID (1 byte)
- Port ID (1 byte)
- VLAN ID (2 bytes)
- Information that you specify (up to 23 English keyboard characters)

5.1.2 DHCP Relay Agent Circuit ID and Remote ID Sub-option Formats

The DHCP relay agent information feature adds an Agent Information field to the option 82 field of the DHCP headers of DHCP request frames that the MSC1000G relays to a DHCP server. The Agent Information field that the MSC1000G adds contains an “Agent Circuit-ID sub-option” that includes the port number, VLAN ID and optional information about the port where the DHCP request was received.

The following figure shows the format of the Agent Circuit ID sub-option. The 1 in the first field identifies this as an Agent Circuit ID sub-option. The length N gives the total number of octets in the Agent Information Field. If the configuration request was received on a DSL port, a 2-byte Port No field specifies the ingress port number (the first byte is always 0, the second byte is in hexadecimal format). The next field is 2 bytes and displays the DHCP request packet's VLAN ID. The last field (A) can range from 0 to 24 bytes and is optional information (that you specify) about this relay agent.

Figure 25 DHCP Relay Agent Circuit ID Sub-option Format

The Agent Information field that the MSC1000G adds also contains an "Agent Remote-ID sub-option" of information that you specify.

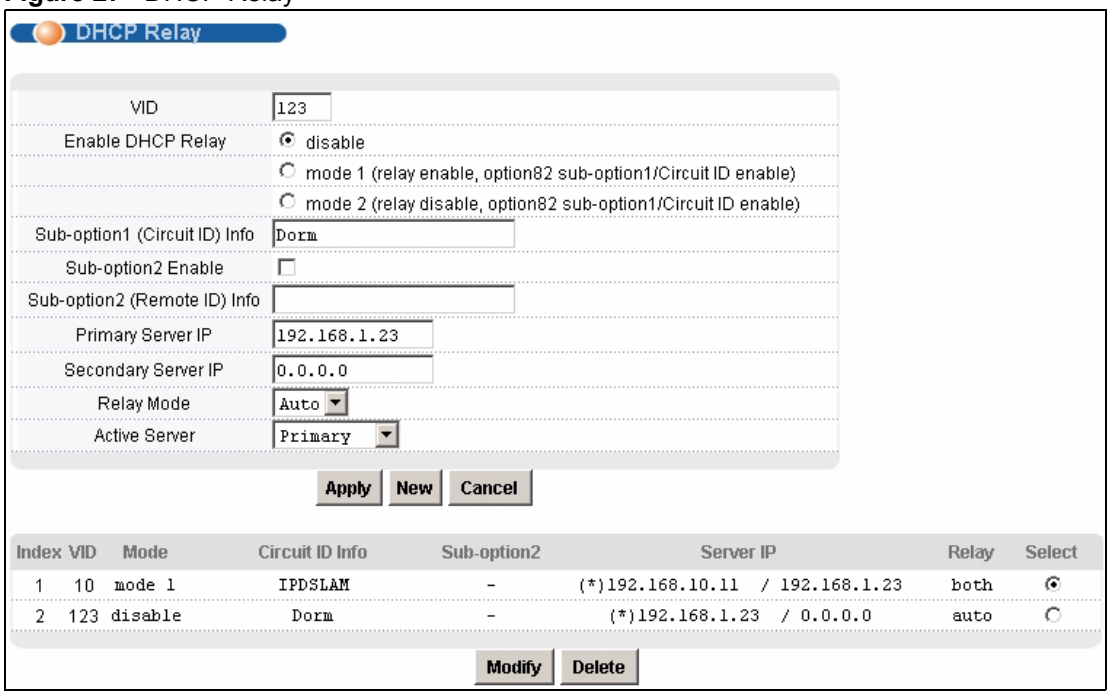
The following figure shows the format of the Agent Remote ID sub-option. The 2 in the first field identifies this as an Agent Remote ID sub-option. The length N gives the total number of octets in the Agent Information Field. Then there is the number of the port (in plain text format) upon which the DHCP client request was received. The next field (B in the figure) is 0 to 23 bytes of optional information that you specify. This is followed by the name and telephone number configured for the ADSL port. The port number, optional information (B in the figure), ADSL name and ADSL telephone number fields are separated by forward slashes.

Figure 26 DHCP Relay Agent Remote ID Sub-option Format

5.2 DHCP Relay Screen

Click **ACL > DHCP Relay** to display the screen shown next.

Figure 27 DHCP Relay



The following table describes the labels in this screen.

Table 7 DHCP Relay

LABEL	DESCRIPTION
VID	Enter a VLAN ID (between 1 and 4094) to be served with DHCP relay.
Enable DHCP Relay	Select **disable** to deactivate the DHCP relay service in this VLAN. Select **mode 1** to activate DHCP relay service and have the MSC1000G add the originating port numbers, VLAN ID and additional information (if configured) to the client DHCP requests for this VLAN. Select mode 2 to disable DHCP relay service but have the MSC1000G add the originating port numbers, VLAN ID and additional information (if configured) to the client DHCP requests. Before broadcasting, the MSC1000G adds the originating port numbers, VLAN ID and additional information (if configured) to DHCP requests.
Sub-option1 (Circuit ID) Info	Use this field to specify up to 23 English keyboard characters of additional information for the MSC1000G to add to the DHCP requests that it relays to a DHCP server. Examples of information you could add would be the name of the MSC1000G or the ISP.
Sub-option2 Enable	Select this option to have the MSC1000G add the sub-option 2 (Remote ID) to the client DHCP requests for this VLAN.
Sub-option2 (Remote ID) Info	Use this field to specify up to 23 English keyboard characters of additional information for the MSC1000G to add to the DHCP requests that it relays to a DHCP server. This field is configurable only when you select **Sub-option2 Enable**.
Primary/ Secondary Server IP	Enter the IP addresses of the remote DHCP servers to which the switch should relay DHCP requests.

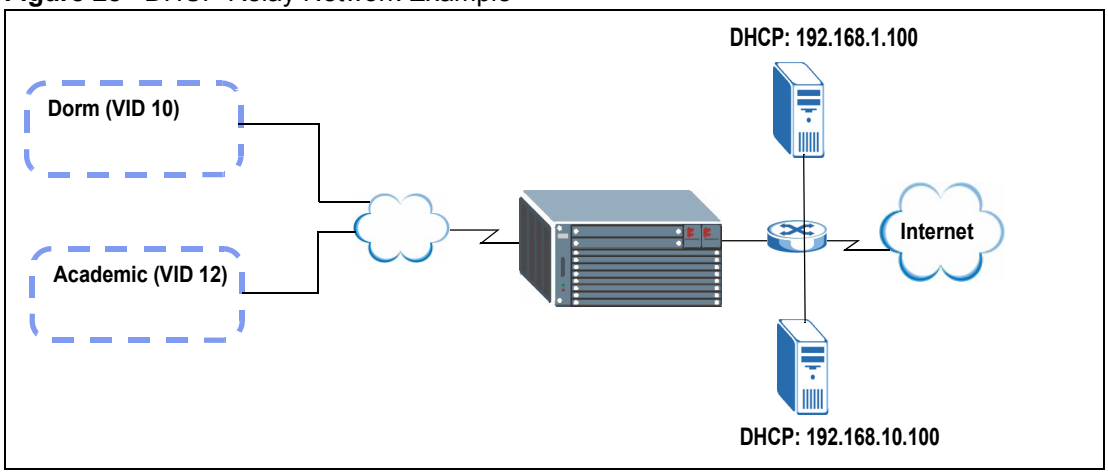
Table 7 DHCP Relay (continued)

LABEL	DESCRIPTION
Relay Mode	Select **Auto** to have the system send DHCP requests to the active DHCP server first. If the active DHCP server does not respond, the system sends the DHCP request to the other DHCP server which then becomes the active DHCP server. Select **Both** to have the switch send DHCP requests to both the primary and secondary DHCP servers.
Active Server	Specify to which DHCP server (**Primary** or **Secondary**) the system is to forward this VLAN's DHCP request first.
Apply	Click **Apply** to save the changes in this screen to the system's volatile memory. The system loses these changes if it is turned off or loses power, so use the **Config Save** on the navigation panel and then the **Save** button to save your changes to the non-volatile memory when you are done configuring.
New	Click **New** to create a new DHCP relay entry.
Cancel	Click **Cancel** to begin configuring this screen afresh.
Index	This is the index number of an entry.
VID	This is the ID number of the VLAN group.
Mode	This field displays whether the DHCP relay setting is activated or not.
Circuit ID Info	This field displays the sub-option 1 information to add to the DHCP request packets.
Sub-option2	This field displays whether information (configured in the **Sub-option 2 Info** field) will be included in the client DHCP requests for this VLAN or not (**V** for enabled, **-** for disabled).
Server IP	This is the IP address of the primary/secondary DHCP server. An asterisk in parentheses (*) indicates which DHCP server is active for each VLAN.
Relay	This field displays the DHCP relay mode.
Select	Select an entry's **Select** check box and click **Delete** to remove the entry or click **Modify** to edit the entry.
Modify	Click **Modify** to change the settings of the selected entry.
Delete	Click **Delete** to remove the selected entries.

5.2.1 Example: DHCP Relay for Two VLANs

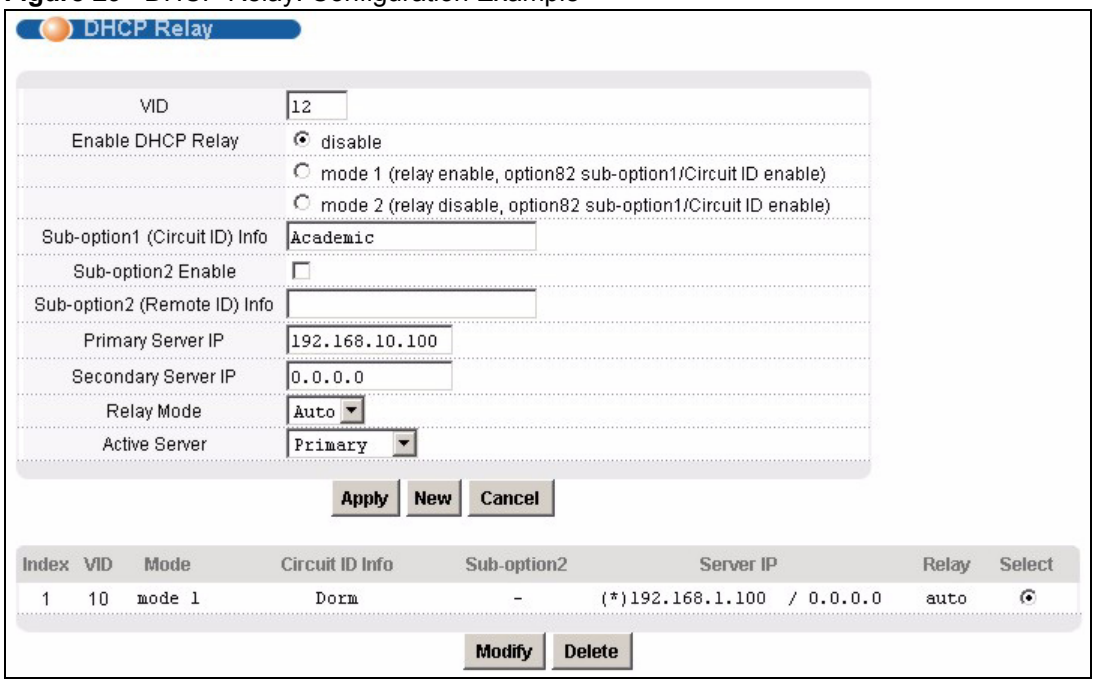
The following example displays two VLANs (VIDs10 and 12) for the campus network. Two DHCP servers are installed to serve each VLAN. The system is set up to forward DHCP requests from the dormitory rooms (VLAN 10) to the DHCP server with an IP address of 192.168.1.100. Requests from the academic buildings (VLAN 12) are sent to the other DHCP server with an IP address of 172.168.10.100.

Figure 28 DHCP Relay Network Example



For the example network, configure the **DHCP Relay** screen as shown.

Figure 29 DHCP Relay: Configuration Example



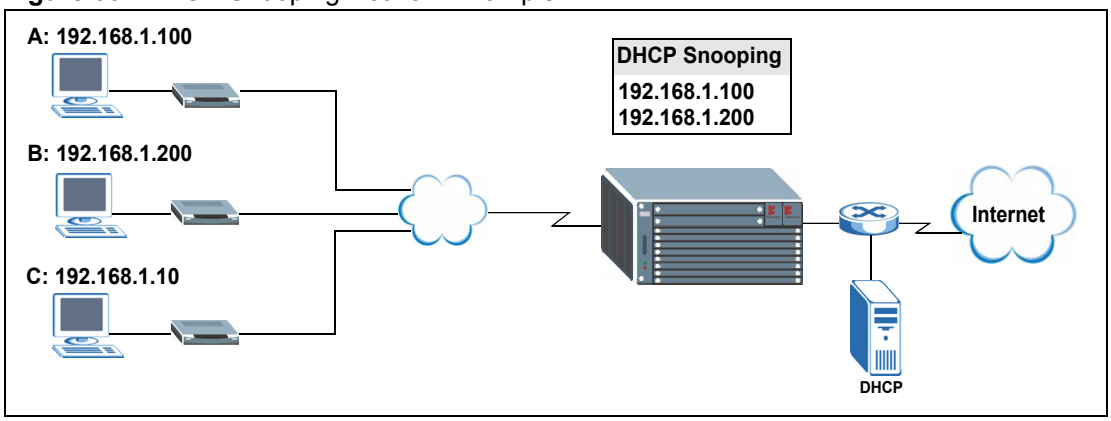
5.3 DHCP Snooping

With DHCP snooping, the system obtains a client's MAC-IP address information (in the reply messages from a DHCP server) and stores it in the DHCP snooping table. Frames with known source IP addresses are allowed to go through the subscriber ports. Frames from unknown IP addresses are dropped. This feature prevents subscribers from assigning their own static IP addresses that may conflict with a DHCP-assigned IP address.

You can also specify static IP addresses (for a subscriber given a static IP address) on a subscriber port. This is useful when service providers assign static WAN IP addresses to some subscribers. This static binding allows the switch to forward frames with the specified IP addresses.

In the following network example, the DHCP snooping table on the switch contains two source IP addresses: 192.168.1.100 (DHCP-assigned) and 192.168.1.200 (static). Traffic from computers **A** and **B** is allowed to go through the DSL ports. While traffic from computer **C** is blocked since its IP address is unknown to the switch (not in the DHCP snooping table).

Figure 30 DHCP Snooping Network Example



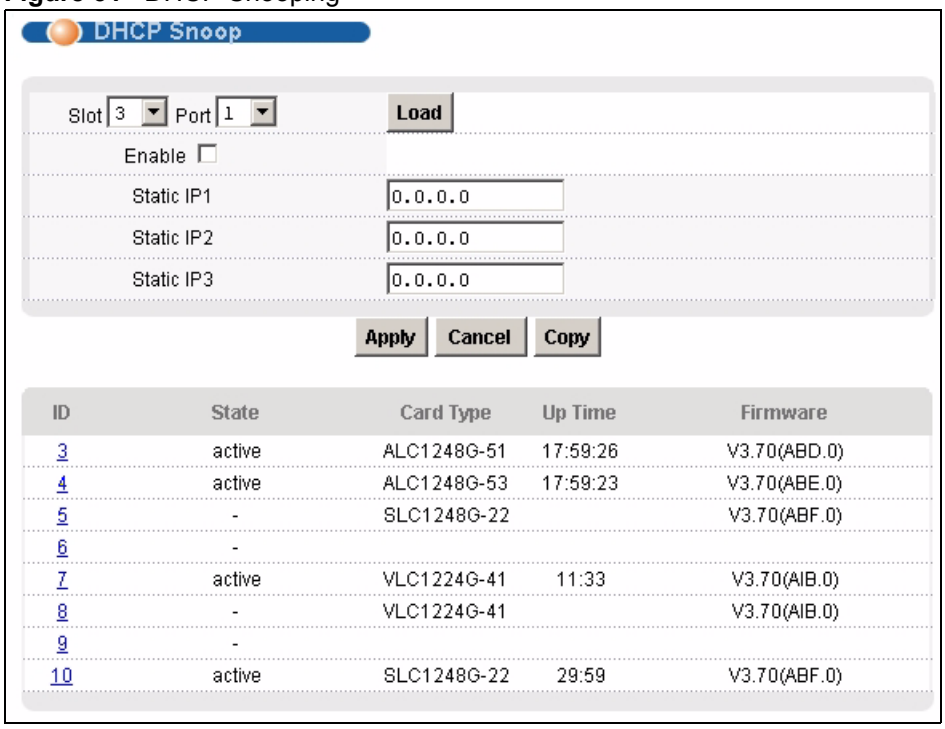
5.3.1 Anti-IP Address Spoofing

While performing DHCP snooping, a line card records which IP address is assigned to each DHCP client MAC address. and which VLAN the client uses. The line card drops packets from a device using an IP address that is assigned to a different MAC address.

5.4 DHCP Snooping Configuration

Click **ACL > DHCP Snoop** to display the screen shown next.

Figure 31 DHCP Snooping

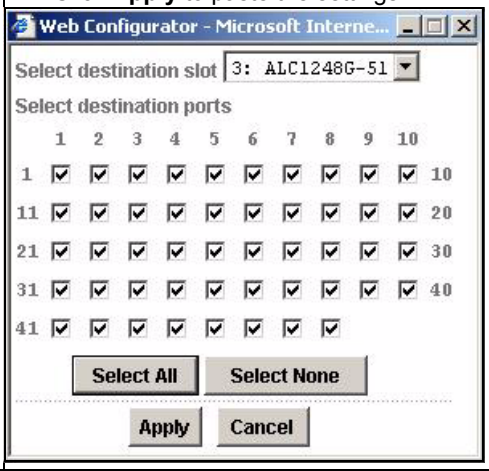


The following table describes the labels in this screen.

Table 8 DHCP Snooping

LABEL	DESCRIPTION
Slot Port	Use the drop-down list boxes to select a DSL port on a line card for which you want to configure DHCP snooping.
Load	Click **Load** to display the port's current settings.
Enable	Select the check box to activate DHCP snooping on the specified DSL port.
Static IP1 .. 3	Specify the static IP addresses of frames you want the switch to allow passage on the port. Enter the IP address in dotted decimal notation. For example, 192.168.1.100. Note: Make sure the specified static IP addresses are not in the DHCP client pool on the DHCP server.
Apply	Click **Apply** to save the changes in this screen to the system's volatile memory. The system loses these changes if it is turned off or loses power, so use the **Config Save** on the navigation panel and then the **Save** button to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to begin configuring the screen again.

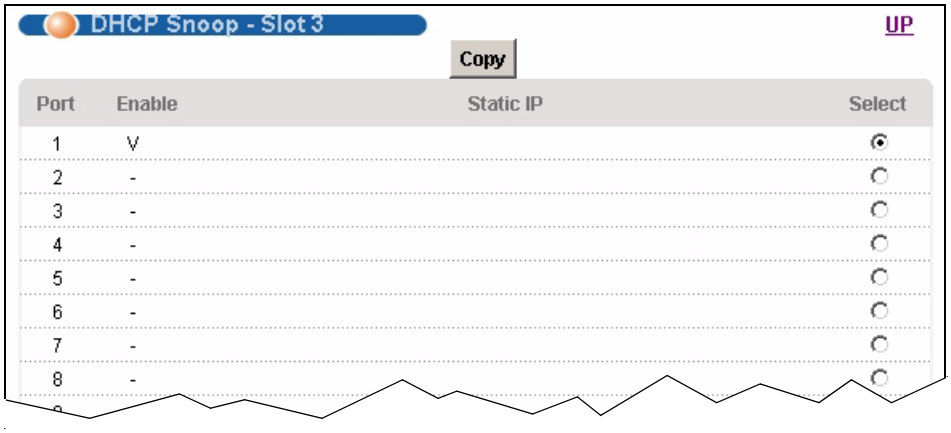
Table 8 DHCP Snooping (continued)

LABEL	DESCRIPTION
Copy	Do the following to copy the settings you configure above to another port or ports. 1. Click **Copy**. 2. Select to which line card you want to copy the settings. 3. Select to which ports on the line card you want to copy the settings. Use **Select All** to select every port. Use **Select None** to clear all of the check boxes. 4. Click **Apply** to paste the settings. 
ID	This is the slot number of a line card. Click the index number of an active line card to display the **DHCP Snoop Slot** screen where you can view and copy settings from one port to another port or ports on the selected line card.
State	This field displays the line card's current operational status. **active** means the line card is operating normally. **init** means the MSC1000G is initializing the line card. **disable** means a manager has disabled the line card. **inactive** means the line card is starting up or is not operating normally. This could be due to the card starting, a firmware upgrade in progress or a malfunction. See Section 34.6 on page 598 for what to do if the line card stays stuck in the inactive state.
Card Type	This field displays the type of a line card.
Up Time	This field displays how long the line card has been running since the last time it was started.
Firmware	This field displays the current firmware version installed on the line card.

5.4.1 DHCP Snooping Slot Screen

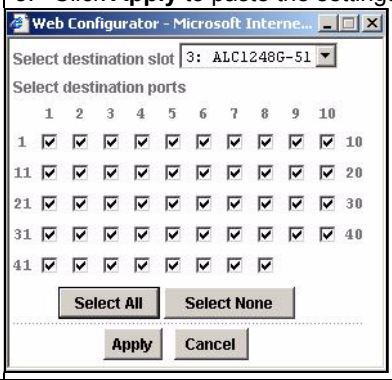
Click the slot number of an active line card in the **DHCP Snoop** screen to display the screen shown next.

Figure 32 DHCP Snooping: Slot



The following table describes the labels in this screen.

Table 9 DHCP Snooping: Slot

LABEL	DESCRIPTION
UP	Click **UP** to go back to the previous screen.
Copy	Do the following to copy settings from one port to another port or ports. 1. Select the **Select** radio button of the port from which you want to copy settings 2. Click **Copy**. 3. Select to which line card you want to copy the settings. 4. Select to which ports on the line card you want to copy the settings. Use **Select All** to select every port. Use **Select None** to clear all of the check boxes. 5. Click **Apply** to paste the settings. 
Port	This field displays the number of the DSL port.
Enable	This field displays whether DHCP snooping is activated on the specified DSL port or not (**V** for enabled, **-** for disabled).
Static IP	This field displays the static IP addresses in the DHCP snooping table for a port.
Select	Select the radio button of the port from which you want to copy settings.

5.4.2 Example: DHCP Snooping

The following figures show the DHCP snooping configuration for computers **A** and **B** in the example network shown in Figure 30 on page 86. In this example, the line card in slot 3 has computer **A** connected to DSL port 1 and computer **B** connected to DSL port 10.

Figure 33 DHCP Snooping: Computer A Example

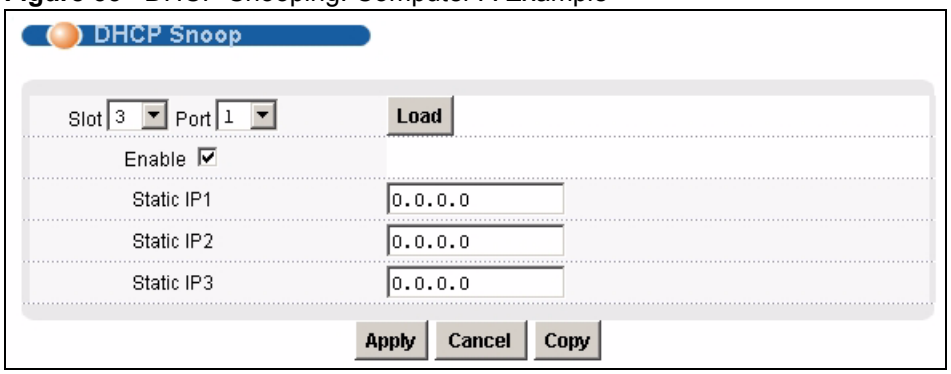
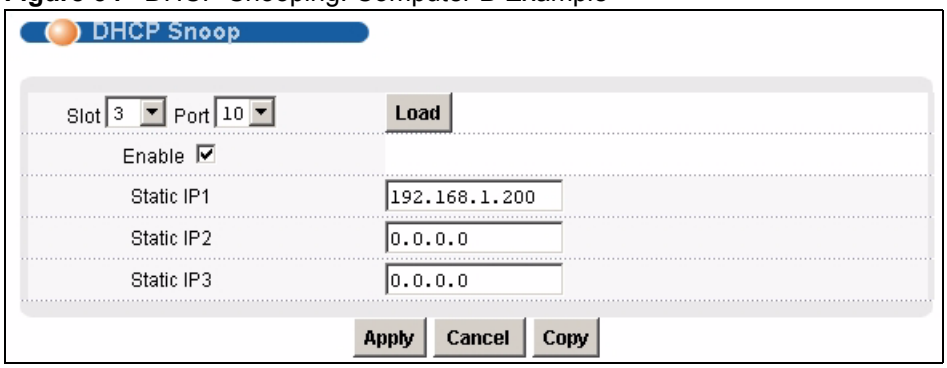


Figure 34 DHCP Snooping: Computer B Example

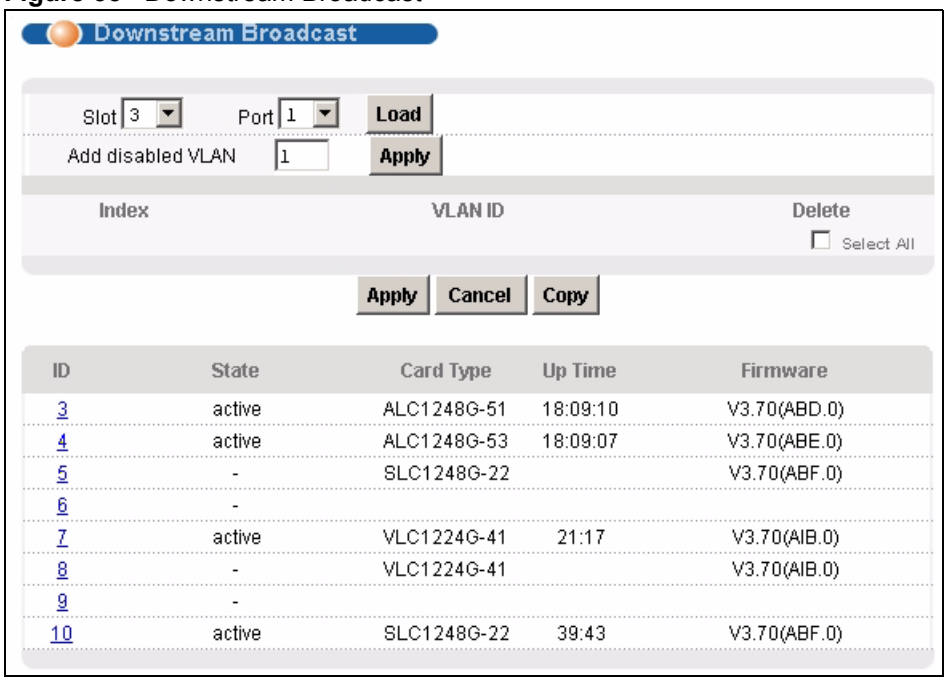


5.5 Downstream Broadcast Screen

Downstream broadcast allows you to block downstream broadcast packets from being sent to specified VLANs on specified ports.

Click **ACL > Downstream Broadcast** to display the screen shown next.

Figure 35 Downstream Broadcast

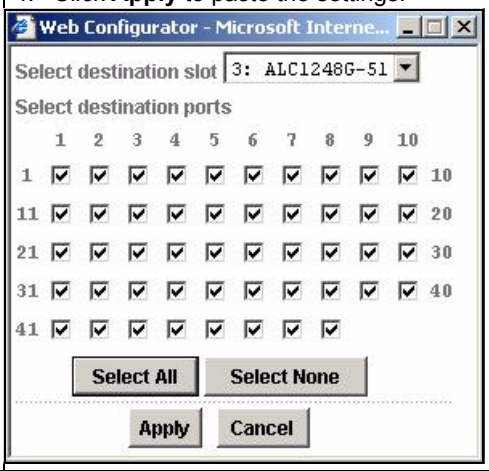


The following table describes the labels in this screen.

Table 10 Downstream Broadcast

LABEL	DESCRIPTION
Slot Port	Use the drop-down list boxes to select an DSL port on an active line card for which you want to configure downstream broadcast blocking.
Load	Click **Load** to display the port's current settings.
Add disabled VLAN	Specify the number of a VLAN (on this port) to which you do not want to send broadcast traffic. The VLAN must already be configured in the system.
Apply	Click **Apply** to save the changes in this screen to the system's volatile memory. The system loses these changes if it is turned off or loses power, so use the **Config Save** on the navigation panel and then the **Save** button to save your changes to the non-volatile memory when you are done configuring.
Index	This is the number of the downstream broadcast blocking entry.
VLAN ID	This field displays the number of a VLAN to which you do not want to send broadcast traffic (through the specified port).
Delete	Select one or more entries' check boxes and then use the **Apply** button to remove it (or them). Use the **Select All** check box to select all of the entries for the specified line card's port.
Apply	Click **Apply** to save the changes in this screen to the system's volatile memory. The system loses these changes if it is turned off or loses power, so use the **Config Save** on the navigation panel and then the **Save** button to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to begin configuring the screen again.

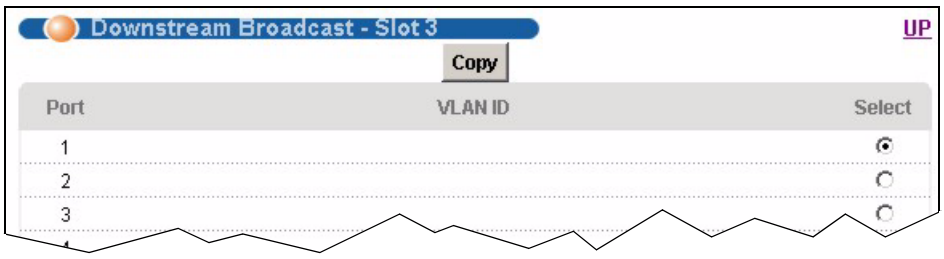
Table 10 Downstream Broadcast (continued)

LABEL	DESCRIPTION
Copy	Do the following to copy the settings you configure above to another port or ports. 1. Click **Copy**. 2. Select to which line card you want to copy the settings. 3. Select to which ports on the line card you want to copy the settings. Use **Select All** to select every port. Use **Select None** to clear all of the check boxes. 4. Click **Apply** to paste the settings. 
ID	This is the slot number of a line card. Click the index number of an active line card to display the **Bandwidth Broadcast Slot** screen where you can view and copy settings from one port to another port or ports on the selected line card.
State	This field displays the line card's current operational status. **active** means the line card is operating normally. **init** means the MSC1000G is initializing the line card. **disable** means a manager has disabled the line card. **inactive** means the line card is starting up or is not operating normally. This could be due to the card starting, a firmware upgrade in progress or a malfunction. See Section 34.6 on page 598 for what to do if the line card stays stuck in the inactive state.
Card Type	This field displays the type of a line card.
Up Time	This field displays how long the line card has been running since the last time it was started.
Firmware	This field displays the current firmware version installed on the line card.

5.5.1 Downstream Broadcast Slot Screen

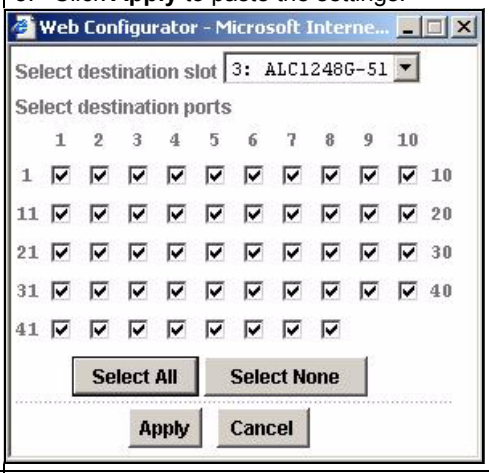
Click the slot number of an active line card in the **Downstream Broadcast** screen to display the screen shown next.

Figure 36 Downstream Broadcast: Slot



The following table describes the labels in this screen.

Table 11 Downstream Broadcast: Slot

LABEL	DESCRIPTION
UP	Click **UP** to go back to the previous screen.
Copy	Do the following to copy settings from one port to another port or ports. 1. Select the **Select** radio button of the port from which you want to copy settings 2. Click **Copy**. 3. Select to which line card you want to copy the settings. 4. Select to which ports on the line card you want to copy the settings. Use **Select All** to select every port. Use **Select None** to clear all of the check boxes. 5. Click **Apply** to paste the settings. 
Port	This field displays the number of the DSL port.
VLAN ID	This field displays the number of a VLAN to which you do not want to send broadcast traffic (through the specified port).
Select	Select the radio button of the port from which you want to copy settings.

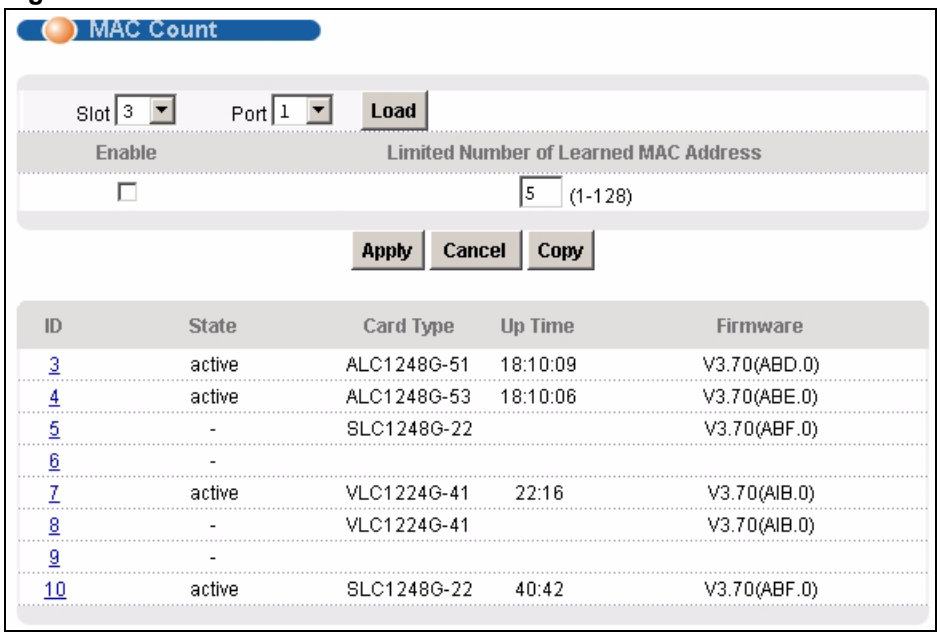
5.6 MAC Count Screen

This screen allows you to limit how many MAC addresses may be dynamically learned on a DSL port.

You cannot enable both MAC count and MAC filtering on the same port at the same time.

Click **ACL > MAC Count** to display the screen shown next.

Figure 37 MAC Count

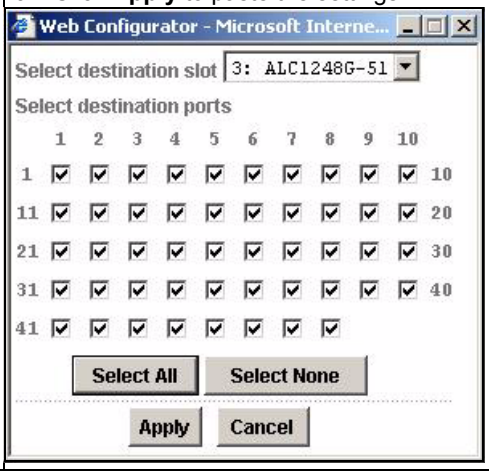


The following table describes the labels in this screen.

Table 12 MAC Count

LABEL	DESCRIPTION
Slot Port	Use the drop-down list boxes to select an DSL port on a line card for which you want to configure the MAC count limit.
Load	Click **Load** to display the port's current settings.
Enable	Select the check box to activate the MAC count limit on the specified DSL port. You can only enable the MAC count filter on DSL ports that do not have the MAC filter enabled.
Limited Number of Learned MAC Address	Specify how many MAC addresses the system can dynamically learn on this port. The range is 1~128. For example, if you are configuring port 2 and you set this field to "5", then only five devices with dynamically learned MAC addresses may access port 2 at any one time. A sixth device would have to wait until one of the five learned MAC addresses ages out.
Apply	Click **Apply** to save the changes in this screen to the system's volatile memory. The system loses these changes if it is turned off or loses power, so use the **Config Save** on the navigation panel and then the **Save** button to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to begin configuring the screen again.

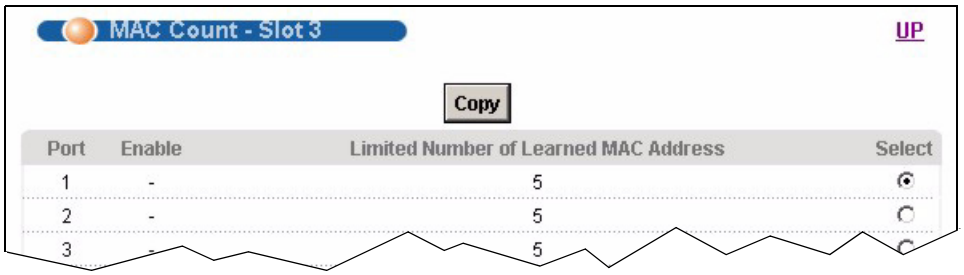
Table 12 MAC Count (continued)

LABEL	DESCRIPTION
Copy	Do the following to copy the settings you configure above to another port or ports. 6. Click **Copy**. 7. Select to which line card you want to copy the settings. 8. Select to which ports on the line card you want to copy the settings. Use **Select All** to select every port. Use **Select None** to clear all of the check boxes. 9. Click **Apply** to paste the settings. 
ID	This is the slot number of a line card. Click the index number of an active line card to display the **MAC Count Slot** screen where you can view and copy settings from one port to another port or ports on the selected line card.
State	This field displays the line card's current operational status. **active** means the line card is operating normally. **init** means the MSC1000G is initializing the line card. **disable** means a manager has disabled the line card. **inactive** means the line card is starting up or is not operating normally. This could be due to the card starting, a firmware upgrade in progress or a malfunction. See Section 34.6 on page 598 for what to do if the line card stays stuck in the inactive state.
Card Type	This field displays the type of a line card.
Up Time	This field displays how long the line card has been running since the last time it was started.
Firmware	This field displays the current firmware version installed on the line card.

5.6.1 MAC Count Slot Screen

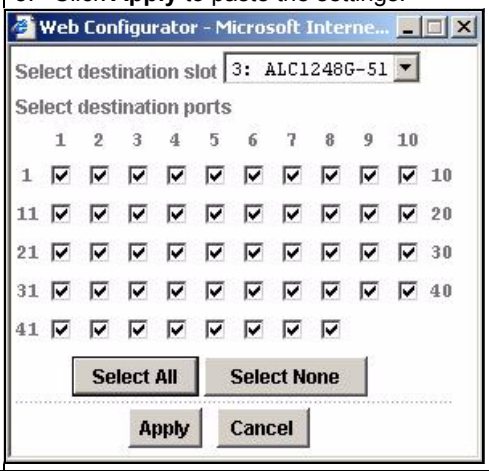
Click the slot number of an active line card in the **MAC Count** screen to display the screen shown next.

Figure 38 MAC Count: Slot



The following table describes the labels in this screen.

Table 13 MAC Count: Slot

LABEL	DESCRIPTION
UP	Click **UP** to go back to the previous screen.
Copy	Do the following to copy settings from one port to another port or ports. 1. Select the **Select** radio button of the port from which you want to copy settings 2. Click **Copy**. 3. Select to which line card you want to copy the settings. 4. Select to which ports on the line card you want to copy the settings. Use **Select All** to select every port. Use **Select None** to clear all of the check boxes. 5. Click **Apply** to paste the settings. 
Port	This field displays the number of the DSL port.
Enable	This field displays whether the MAC count limit is activated on the specified DSL port or not (**V** for enabled, **-** for disabled).
Limited Number of Learned MAC Address	This fields displays how many MAC addresses a port may dynamically learn.
Select	Select the radio button of the port from which you want to copy settings.

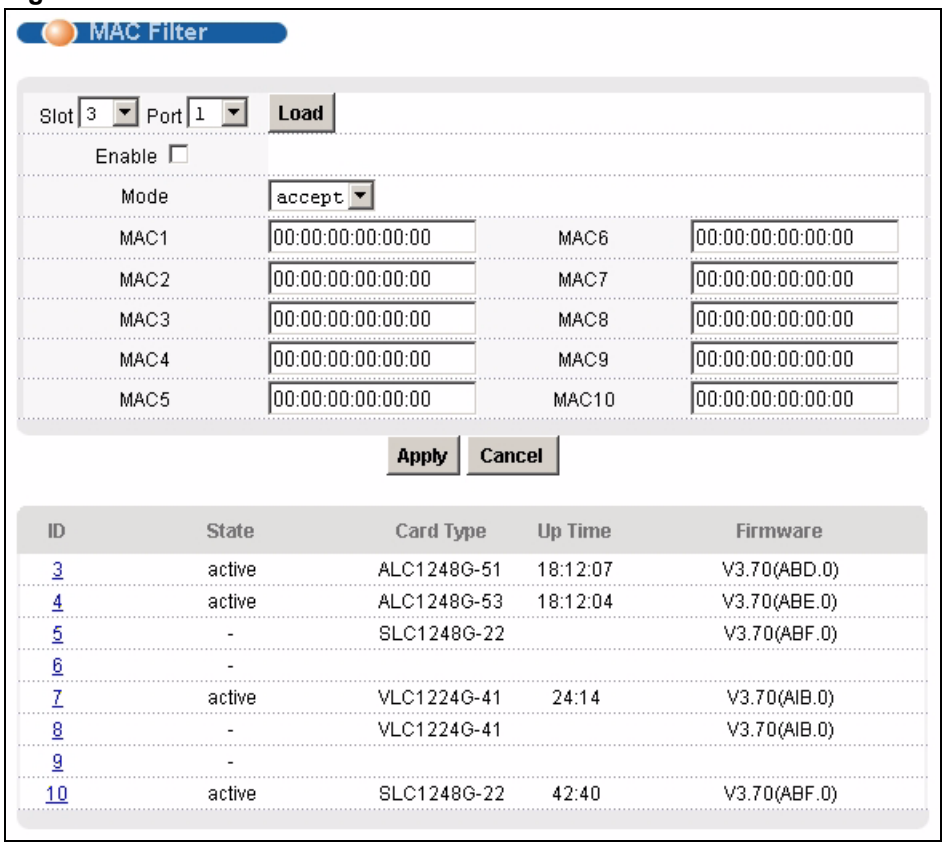
5.7 MAC Filter Screen

Use MAC filter to allow or block frames from MAC (Media Access Control) address(es) that you specify to come in through a port. You may specify up to ten MAC addresses per port.

You cannot enable both MAC filtering and MAC count on the same port at the same time.

Click **ACL > MAC Filter** to display the screen shown next.

Figure 39 MAC Filter



The following table describes the labels in this screen.

Table 14 MAC Filter

LABEL	DESCRIPTION
Slot Port	Use the drop-down list boxes to select an DSL port on a line card for which you wish to configure MAC filtering.
Load	Click **Load** to display the port's current settings.
Enable	Select the check box to turn on the MAC filtering feature on a line card's specified DSL port.
Mode	Select **accept** to only allow frames from MAC addresses that you specify and block frames from other MAC addresses. Select **deny** to block frames from MAC addresses that you specify and allow frames from other MAC addresses.
MAC1~10	Type a device's MAC address in hexadecimal notation (xx:xx:xx:xx:xx:xx, where x is a number from 0 to 9 or a letter from a to f) in this field. The MAC address must be a valid MAC address.

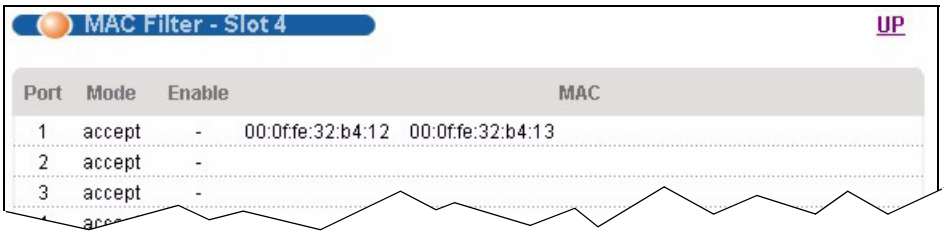
Table 14 MAC Filter (continued)

LABEL	DESCRIPTION
Apply	Click **Apply** to save the changes in this screen to the system's volatile memory. The system loses these changes if it is turned off or loses power, so use the **Config Save** on the navigation panel and then the **Save** button to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to begin configuring the screen again.
ID	This is the slot number of a line card. Click the index number of an active line card to display the **MAC Filter Slot** screen where you can view MAC filtering settings on the specified line card.
State	This field displays the line card's current operational status. **active** means the line card is operating normally. **init** means the MSC1000G is initializing the line card. **disable** means a manager has disabled the line card. **inactive** means the line card is starting up or is not operating normally. This could be due to the card starting, a firmware upgrade in progress or a malfunction. See Section 34.6 on page 598 for what to do if the line card stays stuck in the inactive state.
Card Type	This field displays the type of a line card.
Up Time	This field displays how long the line card has been running since the last time it was started.
Firmware	This field displays the current firmware version installed on the line card.

5.7.1 MAC Filter Slot Screen

Click the slot number of an active line card in the **MAC Filter** screen to display the screen shown next.

Figure 40 MAC Filter: Slot



The following table describes the labels in this screen.

Table 15 MAC Filter: Slot

LABEL	DESCRIPTION
UP	Click **UP** to go back to the previous screen.
Port	This field displays the number of the DSL port.
Mode	This field displays the filter action.
Enable	This field displays whether MAC filtering is activated on the specified DSL port or not (**V** for enabled, **-** for disabled).
MAC	This fields displays the MAC address(es) you set for the port.

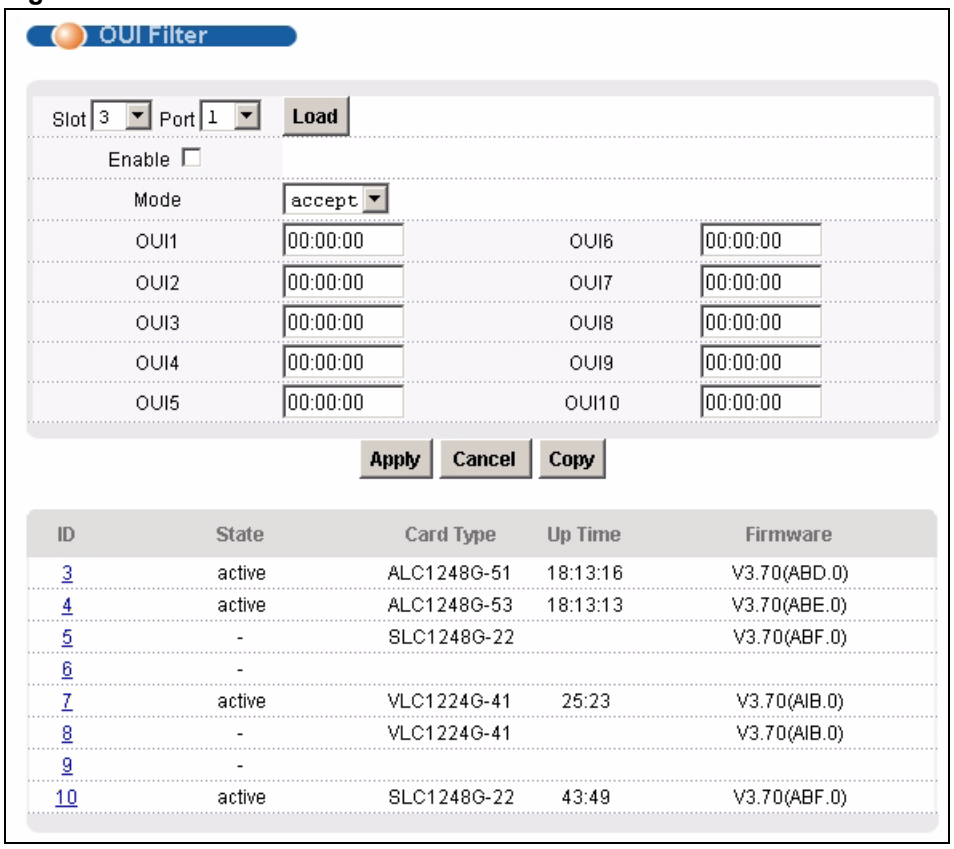
5.8 OUI Filter

Configure an OUI (Organizationally Unique Identifier) filter to block or forward packets from devices with the specified OUI in the MAC address.

The OUI field is the first three octets in a MAC address. An OUI uniquely identifies the manufacturer of a network device and allows you to identify from which device brands the switch will accept traffic or send traffic to. The OUI value is assigned by the IANA.

Click **ACL > OUI Filter** to display the configuration screen.

Figure 41 OUI Filter

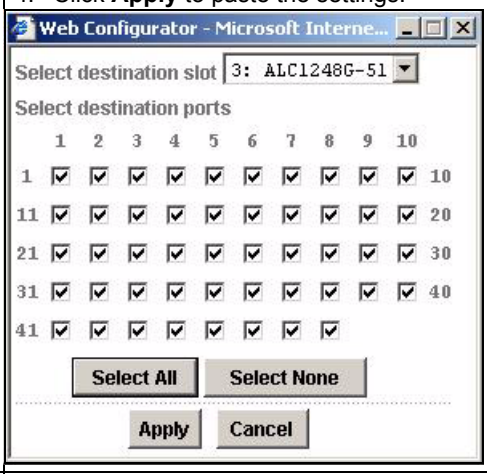


The following table describes the labels in this screen.

Table 16 OUI Filter

LABEL	DESCRIPTION
Slot Port	Use the drop-down list boxes to select an DSL port on a line card for which you wish to configure packet type filtering.
Load	Click **Load** to display the port's current settings.
Enable	Select **Enable** to activate this filter. Clear this check box to disable the filter without deleting it.
Mode	Specify the action on matched frames. Select **accept** to allow frames with a matched OUI field in the MAC addresses. The switch blocks frames with other OUIs not specified. Select **deny** to block frames with a matched OUI field in the MAC addresses. The switch allows frames with other OUIs not specified.

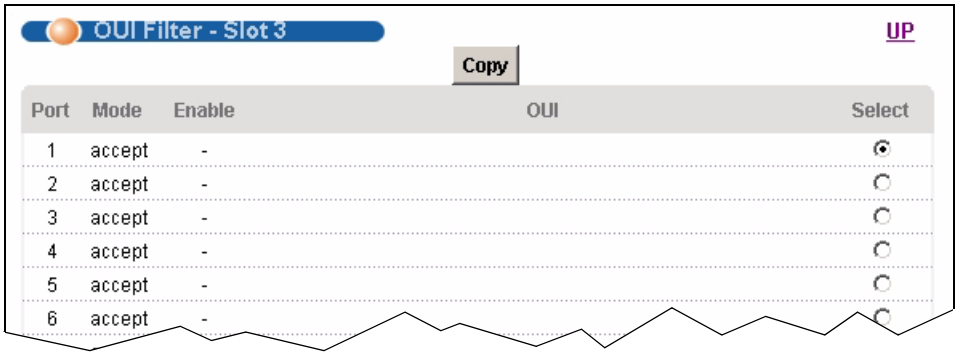
Table 16 OUI Filter (continued)

LABEL	DESCRIPTION
OUI1.. 10	Enter the first three octets of a MAC address in the format xx:xx:xx. For example, 00:0F:FE.
Apply	Click **Apply** to save the changes in this screen to the system's volatile memory. The system loses these changes if it is turned off or loses power, so use the **Config Save** on the navigation panel and then the **Save** button to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to begin configuring the screen again.
Copy	Do the following to copy the settings you configure above to another port or ports. 1. Click **Copy**. 2. Select to which line card you want to copy the settings. 3. Select to which ports on the line card you want to copy the settings. Use **Select All** to select every port. Use **Select None** to clear all of the check boxes. 4. Click **Apply** to paste the settings. 
ID	This is the slot number of a line card. Click the index number of an active line card to display the **OUI Filter Slot** screen where you can view and copy settings from one port to another port or ports on the selected line card.
State	This field displays the line card's current operational status. **active** means the line card is operating normally. **init** means the MSC1000G is initializing the line card. **disable** means a manager has disabled the line card. **inactive** means the line card is starting up or is not operating normally. This could be due to the card starting, a firmware upgrade in progress or a malfunction. See Section 34.6 on page 598 for what to do if the line card stays stuck in the inactive state.
Card Type	This field displays the type of a line card.
Up Time	This field displays how long the line card has been running since the last time it was started.
Firmware	This field displays the current firmware version installed on the line card.

5.8.1 OUI Filter Slot Screen

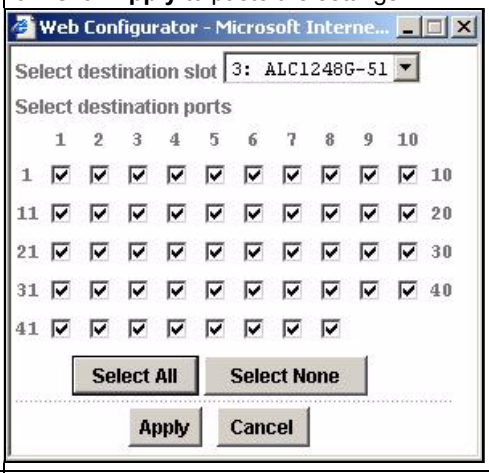
Click the slot number of an active line card in the **OUI Filter** screen to display the screen shown next.

Figure 42 OUI Filter: Slot



The following table describes the labels in this screen.

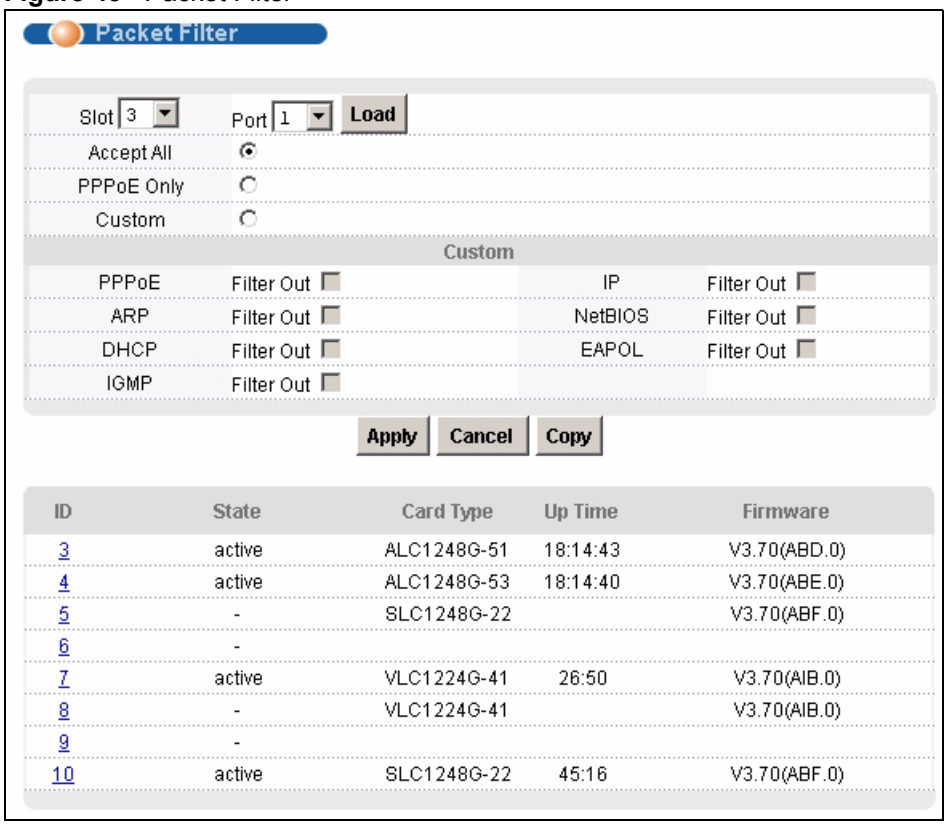
Table 17 DHCP Snooping: Slot

LABEL	DESCRIPTION
UP	Click **UP** to go back to the previous screen.
Copy	Do the following to copy settings from one port to another port or ports. 1. Select the **Select** radio button of the port from which you want to copy settings 2. Click **Copy**. 3. Select to which line card you want to copy the settings. 4. Select to which ports on the line card you want to copy the settings. Use **Select All** to select every port. Use **Select None** to clear all of the check boxes. 5. Click **Apply** to paste the settings. 
Port	This field displays the number of the DSL port.
Mode	This field displays the filter mode (**deny** or **accept**).
Enable	This field displays whether OUI filtering is activated on the specified DSL port or not (**V** for enabled, **-** for disabled).
OUI	This field displays the OUI address to filter on a port.
Select	Select the radio button of the port from which you want to copy settings.

5.9 Packet Filter Screen

Use this screen to set which types of packets the switch accepts on individual DSL ports. Click **ACL > Packet Filter** to display the screen shown next.

Figure 43 Packet Filter

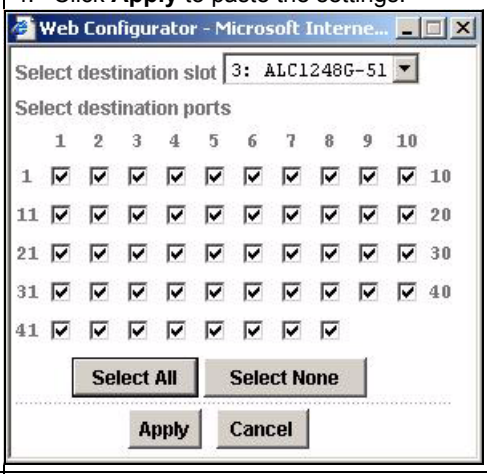


The following table describes the labels in this screen.

Table 18 Packet Filter

LABEL	DESCRIPTION
Slot Port	Use the drop-down list boxes to select an DSL port on a line card for which you wish to configure packet type filtering.
Load	Click **Load** to display the port's current settings.
Select the radio buttons of the types of packets to accept on the ADSL port.	
Accept All	Select **Accept All** to allow any traffic.
PPPoE Only	Select **PPPoE Only** to allow only PPPoE traffic. This will gray out the check boxes for other packet types and the switch will drop any non-PPPoE packets.
Custom	Select **Custom** and specify which types of packets listed below will be blocked.
PPPoE Filter Out	Point-to-Point Protocol over Ethernet relies on PPP and Ethernet. It is a specification for connecting the users on an Ethernet to the Internet through a common broadband medium, such as a single DSL line, wireless device or cable modem.
IP Filter Out	Internet Protocol. The underlying protocol for routing packets on the Internet and other TCP/IP-based networks.
ARP Filter Out	Address Resolution Protocol is a protocol for mapping an Internet Protocol address (IP address) to a physical computer address that is recognized in the local network.
NetBIOS Filter Out	NetBIOS (Network Basic Input/Output System) are TCP or UDP packets that enable a computer to find other computers.

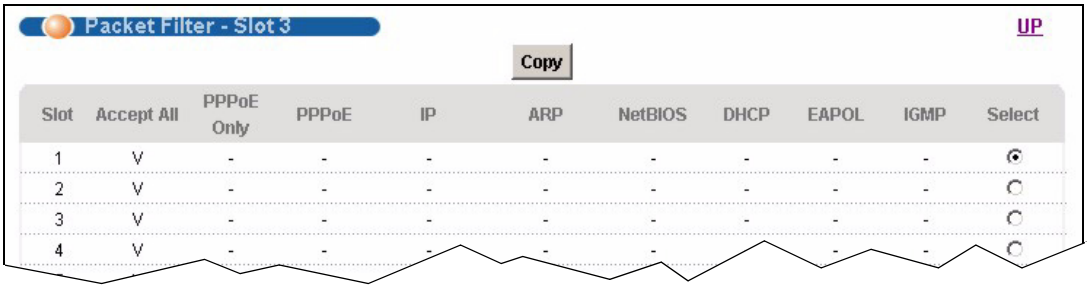
Table 18 Packet Filter (continued)

LABEL	DESCRIPTION
DHCP Filter Out	Dynamic Host Configuration Protocol (DHCP) automatically assigns IP addresses to clients when they log on. DHCP centralizes IP address management on central computers that run the DHCP server program. DHCP leases addresses, for a period of time, which means that past addresses are “recycled” and made available for future reassignment to other systems.
EAPOL Filter Out	EAP (Extensible Authentication Protocol, RFC 2486) over LAN. EAP is used with IEEE 802.1x to allow additional authentication methods (besides RADIUS) to be deployed with no changes to the access point or the wireless clients.
IGMP Filter Out	Internet Group Multicast Protocol is used when sending packets to a specific group of hosts.
Apply	Click **Apply** to save the changes in this screen to the system’s volatile memory. The system loses these changes if it is turned off or loses power, so use the **Config Save** on the navigation panel and then the **Save** button to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to begin configuring the screen again.
Copy	Do the following to copy the settings you configure above to another port or ports. 1. Click **Copy**. 2. Select to which line card you want to copy the settings. 3. Select to which ports on the line card you want to copy the settings. Use **Select All** to select every port. Use **Select None** to clear all of the check boxes. 4. Click **Apply** to paste the settings. 
ID	This is the slot number of a line card. Click the index number of an active line card to display the **Packet Filter Slot** screen where you can view and copy settings from one port to another port or ports on the selected line card.
State	This field displays the line card’s current operational status. **active** means the line card is operating normally. **init** means the MSC1000G is initializing the line card. **disable** means a manager has disabled the line card. **inactive** means the line card is starting up or is not operating normally. This could be due to the card starting, a firmware upgrade in progress or a malfunction. See Section 34.6 on page 598 for what to do if the line card stays stuck in the inactive state.
Card Type	This field displays the type of a line card.
Up Time	This field displays how long the line card has been running since the last time it was started.
Firmware	This field displays the current firmware version installed on the line card.

5.10 Packet Filter Slot Screen

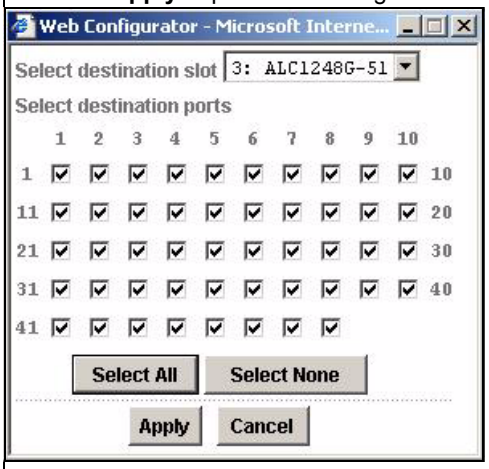
Click the slot number of an active line card in the **Packet Filter** screen to display the screen shown next.

Figure 44 Packet Filter: Slot



The following table describes the labels in this screen.

Table 19 Packet Filter: Slot

LABEL	DESCRIPTION
UP	Click **UP** to go back to the previous screen.
Copy	Do the following to copy settings from one port to another port or ports. 1. Select the **Select** radio button of the port from which you want to copy settings 2. Click **Copy**. 3. Select to which line card you want to copy the settings. 4. Select to which ports on the line card you want to copy the settings. Use **Select All** to select every port. Use **Select None** to clear all of the check boxes. 5. Click **Apply** to paste the settings. 
Slot	This field displays the number of the DSL port.
Accept All, PPPoE Only, PPPoE, IP, ARP, NetBIOS, DHCP, EAPOL, IGMP	These are the packet filter settings for each port. **Accept All** and **PPPoE Only**: "V" displays for the packet types that the system is to accept on the port. "-" displays for packet types that the system is to reject on the port. **PPPoE**, **IP**, **ARP**, **NetBIOS**, **DHCP**, **EAPOL** and **IGMP**: "V" displays for the packet types that the system is to reject on the port. "-" displays for packet types that the system is to accept on the port.
Select	Select the radio button of the port from which you want to copy settings.

5.11 IEEE 802.1x

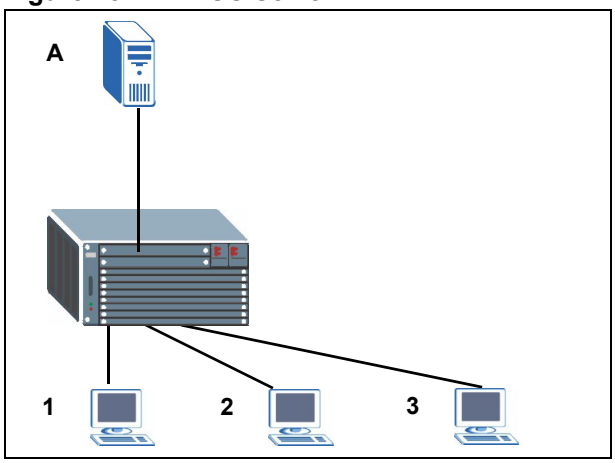
This section describes the IEEE 802.1x authentication method and RADIUS server connection setup.

IEEE 802.1x is an extended authentication protocol[1] that allows support of RADIUS (Remote Authentication Dial In User Service, RFC 2138, 2139) for centralized user profile management on a network RADIUS server.

5.11.1 RADIUS

RADIUS authentication is a popular protocol used to authenticate users by means of an external server instead of (or in addition to) an internal device user database that is limited to the memory capacity of the device. In essence, RADIUS authentication allows you to validate an unlimited number of users from a central location. In the following graphic, the RADIUS server (A) authenticates users 1, 2 and 3.

Figure 45 RADIUS Server

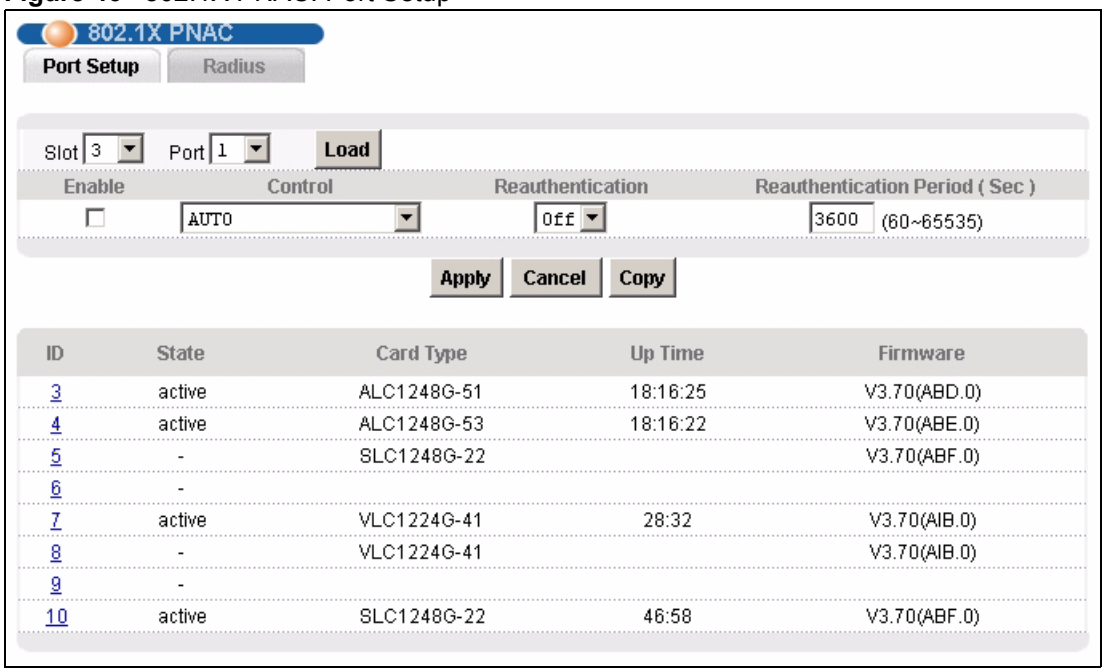


5.12 802.1X PNAC Port Setup Screen

Click **ACL > 802.1X PNAC** to display the screen shown next. PNAC stands for Port-based Network Access Control. Use this screen to configure IEEE 802.1x settings.

1. Not all Windows operating systems support IEEE 802.1x (see the Microsoft web site for details). For other operating systems, see its documentation. If your operating system does not support IEEE 802.1x, then you may need to install IEEE 802.1x client software.

Figure 46 802.1X PNAC: Port Setup

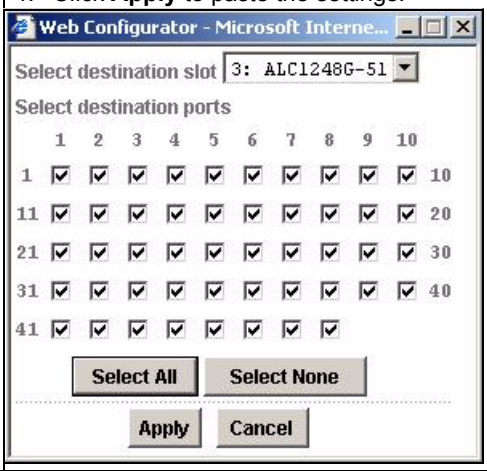


The following table describes the labels in this screen.

Table 20 802.1X PNAC: Port Setup

LABEL	DESCRIPTION
Slot Port	Use the drop-down list boxes to select an DSL port on a line card for which you wish to configure IEEE 802.1x authentication.
Load	Click **Load** to display the port's current settings.
Enable	Select this check box to turn on IEEE 802.1x authentication on the system.
Control	Select **AUTO** to authenticate all subscribers before they can access the network through this port. Select **FORCE AUTHORIZED** to allow all connected users to access the network through this port without authentication. Select **FORCE UNAUTHORIZED** to deny all subscribers access to the network through this port.
Reauthentication	Specify if a subscriber has to periodically re-enter his or her username and password to stay connected to the port.
Reauthentication Period(s)	Specify how often a client has to re-enter his or her username and password to stay connected to the port.
Apply	Click **Apply** to save the changes in this screen to the system's volatile memory. The system loses these changes if it is turned off or loses power, so use the **Config Save** on the navigation panel and then the **Save** button to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to begin configuring the screen again.

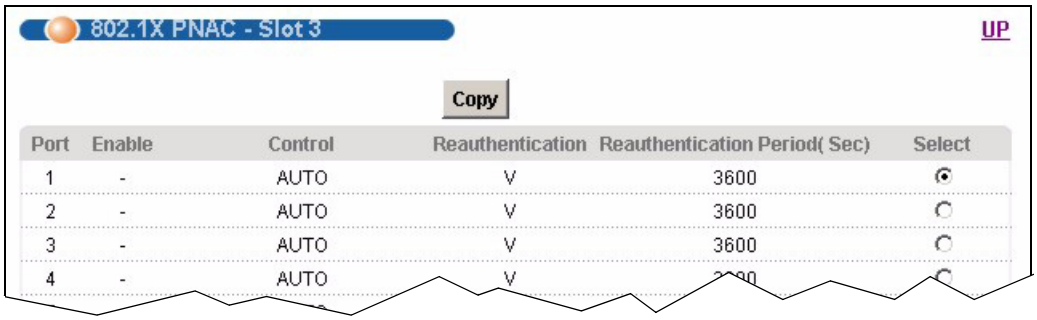
Table 20 802.1X PNAC: Port Setup (continued)

LABEL	DESCRIPTION
Copy	Do the following to copy the settings you configure above to another port or ports. 1. Click **Copy**. 2. Select to which line card you want to copy the settings. 3. Select to which ports on the line card you want to copy the settings. Use **Select All** to select every port. Use **Select None** to clear all of the check boxes. 4. Click **Apply** to paste the settings. 
ID	This is the slot number of a line card. Click the index number of an active line card to display the **802.1X PNAC Slot** screen where you can view and copy settings from one port to another port or ports on the selected line card.
State	This field displays the line card's current operational status. **active** means the line card is operating normally. **init** means the MSC1000G is initializing the line card. **disable** means a manager has disabled the line card. **inactive** means the line card is starting up or is not operating normally. This could be due to the card starting, a firmware upgrade in progress or a malfunction. See Section 34.6 on page 598 for what to do if the line card stays stuck in the inactive state.
Card Type	This field displays the type of a line card.
Up Time	This field displays how long the line card has been running since the last time it was started.
Firmware	This field displays the current firmware version installed on the line card.

5.12.1 802.1X PNAC Slot Screen

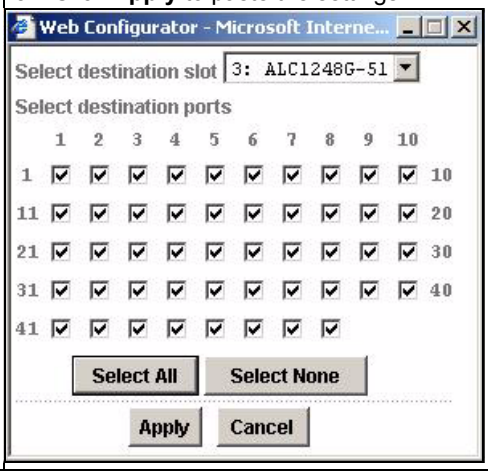
Click the slot number of an active line card in the **Port Setup** screen to display the screen shown next.

Figure 47 802.1X PNAC: Port Setup: Slot



The following table describes the labels in this screen.

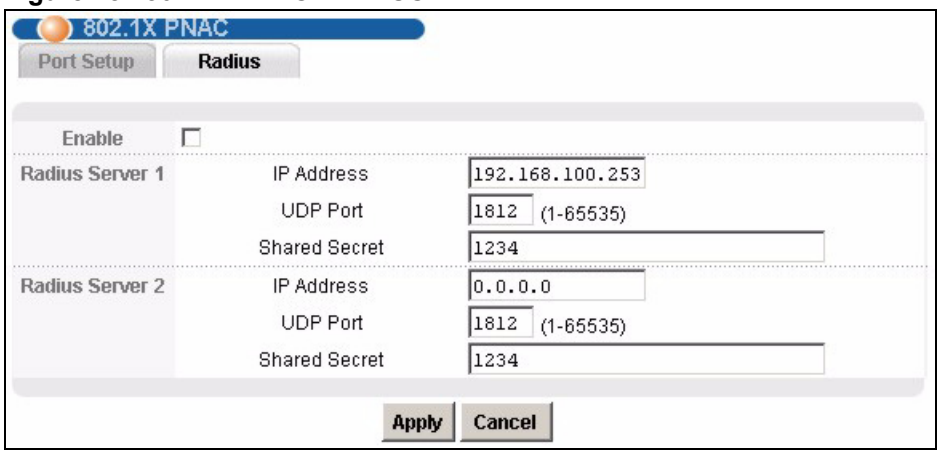
Table 21 802.1X PNAC: Port Setup: Slot

label	description
UP	Click **UP** to go back to the previous screen.
Copy	Do the following to copy settings from one port to another port or ports. 1. Select the **Select** radio button of the port from which you want to copy settings 2. Click **Copy**. 3. Select to which line card you want to copy the settings. 4. Select to which ports on the line card you want to copy the settings. Use **Select All** to select every port. Use **Select None** to clear all of the check boxes. 5. Click **Apply** to paste the settings. 
Port	This field displays the number of the DSL port.
Enable	This field displays whether IEEE 802.1x is turned on or not (**V** for enabled, **-** for disabled).
Control	This field displays the IEEE 802.1x port authentication option for a subscriber port.
Reauthentication	This field displays whether the IEEE 802.1x re-authentication option is turned on or not (V for enabled, - for disabled).
Reauthentication Period (Sec)	This field displays the IEEE 802.1x re-authentication period.
Select	Select the radio button of the port from which you want to copy settings.

5.13 RADIUS Screen

Click **ACL > 802.1X PNAC > RADIUS** to display the screen shown next.

Figure 48 802.1X PNAC: RADIUS



The following table describes the labels in this screen.

Table 22 802.1X PNAC: RADIUS

LABEL	DESCRIPTION
Enable	Select this check box to have the switch use an external RADIUS server to authenticate users.
Radius Server 1/2	
IP address	Enter the IP address of the external RADIUS server in dotted decimal notation.
UDP Port	The default port of the RADIUS server for authentication is **1812**. You need not change this value unless your network administrator instructs you to do so.
Shared Secret	Specify a password (up to 31 alphanumeric characters) as the key to be shared between the external RADIUS server and the system. This key is not sent over the network. This key must be the same on the external RADIUS server and the switch.
Apply	Click **Apply** to save the changes in this screen to the system's volatile memory. The system loses these changes if it is turned off or loses power, so use the **Config Save** on the navigation panel and then the **Save** button to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to begin configuring the screen again.

6

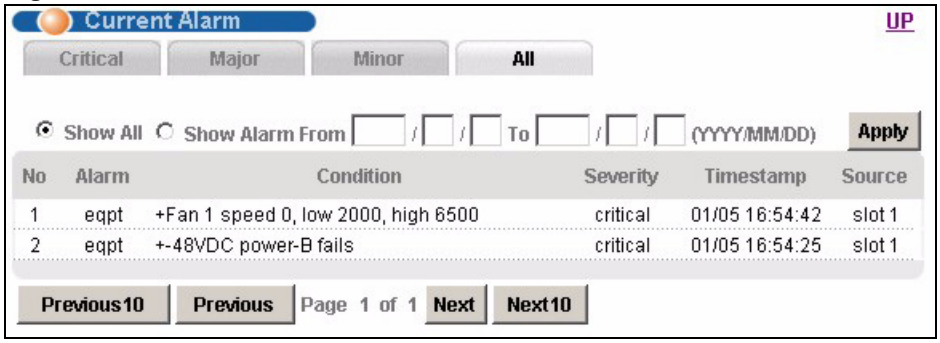
Alarm Screens

This chapter describes alarm management.

6.1 Current Alarm Screen

Click **Alarm > Current Alarm** to display the screen where you can view all current alarms. You can also click a tab to view the alarms only specific to one severity level.

Figure 49 Current Alarm: All



The following table describes the labels in this screen.

Table 23 Current Alarm: All

LABEL	DESCRIPTION
UP	Click **UP** to go to the **System Info** screen.
Show All	Select the radio button to display all alarms.
Show Alarm From To (YYYY/MM/DD)	Select the radio button and specify a range of time in the year/month/day format to display the alarms occur during this period only.
Apply	Click **Apply** to display the alarms (either all or from the time range you selected).
No	This is the index number of the alarm.
Alarm	This is the alarm category.
Condition	This is the alarm condition.
Severity	This is the severity level of alarms.
Timestamp	This is the time when the alarm occurred.
Source	This is the location where the alarm occurred.
Previous 10	Click **Previous 10** to show the preceding 10 pages of information.

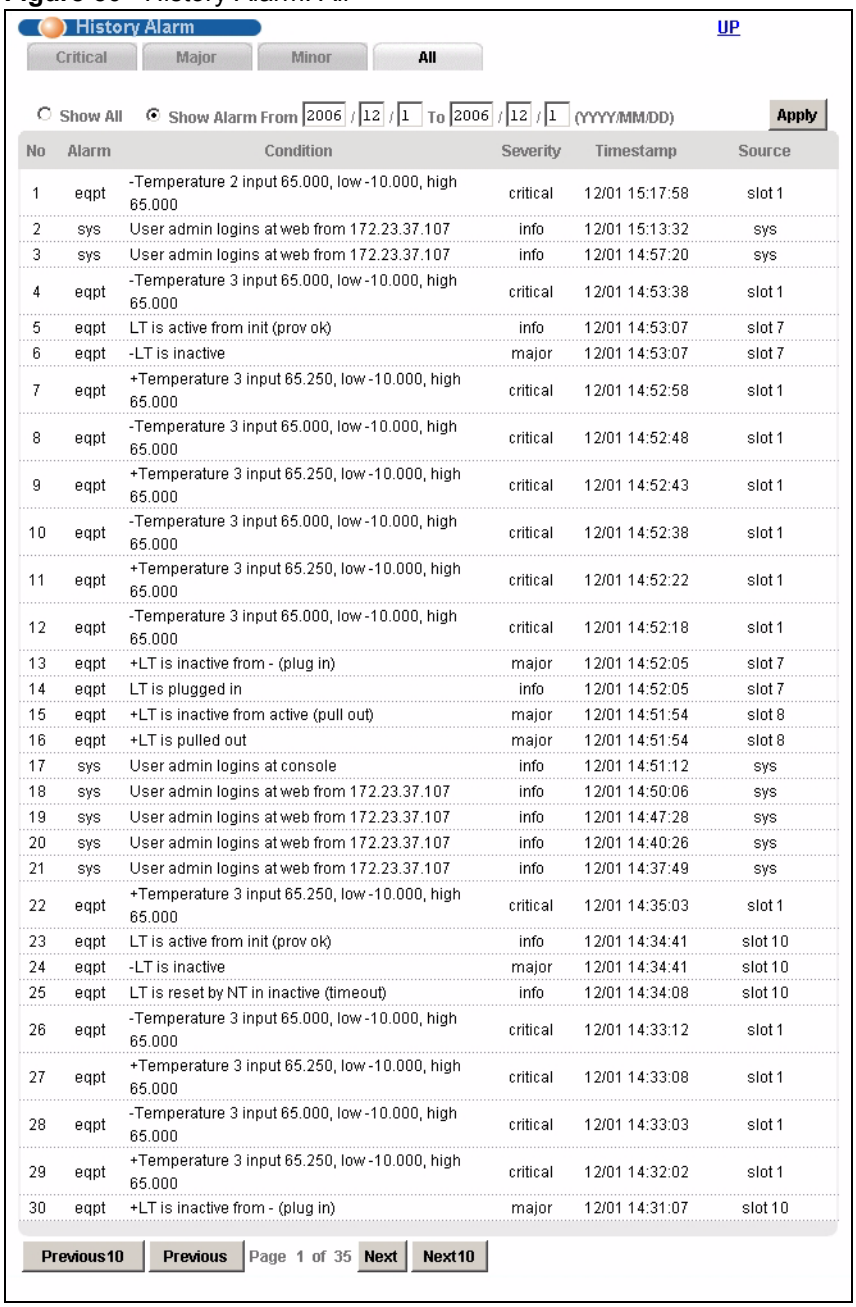
Table 23 Current Alarm: All (continued)

LABEL	DESCRIPTION
Previous Next	Click **Previous** or **Next** to show the preceding/following screen if the information cannot be displayed in one screen.
Next 10	Click **Next 10** to show the following 10 pages of alarms.

6.2 History Alarm Screen

Click **Alarm > History Alarm** to display the screen where you can view all historic alarms. You can also click a tab to view the alarms only specific to one severity level.

Figure 50 History Alarm: All


History Alarm
UP
Critical
Major
Minor
All
Show All
Show Alarm From 2006 / 12 / 1 To 2006 / 12 / 1 (YYYY/MM/DD)
Apply
No Alarm Condition Severity Timestamp Source
1 eqpt -Temperature 2 input 65.000, low -10.000, high 65.000 critical 12/01 15:17:58 slot 1
2 sys User admin logins at web from 172.23.37.107 info 12/01 15:13:32 sys
3 sys User admin logins at web from 172.23.37.107 info 12/01 14:57:20 sys
4 eqpt -Temperature 3 input 65.000, low -10.000, high 65.000 critical 12/01 14:53:38 slot 1
5 eqpt LT is active from init (prov ok) info 12/01 14:53:07 slot 7
6 eqpt -LT is inactive major 12/01 14:53:07 slot 7
7 eqpt +Temperature 3 input 65.250, low -10.000, high 65.000 critical 12/01 14:52:58 slot 1
8 eqpt -Temperature 3 input 65.000, low -10.000, high 65.000 critical 12/01 14:52:48 slot 1
9 eqpt +Temperature 3 input 65.250, low -10.000, high 65.000 critical 12/01 14:52:43 slot 1
10 eqpt -Temperature 3 input 65.000, low -10.000, high 65.000 critical 12/01 14:52:38 slot 1
11 eqpt +Temperature 3 input 65.250, low -10.000, high 65.000 critical 12/01 14:52:22 slot 1
12 eqpt -Temperature 3 input 65.000, low -10.000, high 65.000 critical 12/01 14:52:18 slot 1
13 eqpt +LT is inactive from - (plug in) major 12/01 14:52:05 slot 7
14 eqpt LT is plugged in info 12/01 14:52:05 slot 7
15 eqpt +LT is inactive from active (pull out) major 12/01 14:51:54 slot 8
16 eqpt +LT is pulled out major 12/01 14:51:54 slot 8
17 sys User admin logins at console info 12/01 14:51:12 sys
18 sys User admin logins at web from 172.23.37.107 info 12/01 14:50:06 sys
19 sys User admin logins at web from 172.23.37.107 info 12/01 14:47:28 sys
20 sys User admin logins at web from 172.23.37.107 info 12/01 14:40:26 sys
21 sys User admin logins at web from 172.23.37.107 info 12/01 14:37:49 sys
22 eqpt +Temperature 3 input 65.250, low -10.000, high 65.000 critical 12/01 14:35:03 slot 1
23 eqpt LT is active from init (prov ok) info 12/01 14:34:41 slot 10
24 eqpt -LT is inactive major 12/01 14:34:41 slot 10
25 eqpt LT is reset by NT in inactive (timeout) info 12/01 14:34:08 slot 10
26 eqpt -Temperature 3 input 65.000, low -10.000, high 65.000 critical 12/01 14:33:12 slot 1
27 eqpt +Temperature 3 input 65.250, low -10.000, high 65.000 critical 12/01 14:33:08 slot 1
28 eqpt -Temperature 3 input 65.000, low -10.000, high 65.000 critical 12/01 14:33:03 slot 1
29 eqpt +Temperature 3 input 65.250, low -10.000, high 65.000 critical 12/01 14:32:02 slot 1
30 eqpt +LT is inactive from - (plug in) major 12/01 14:31:07 slot 10
Previous10
Previous
Page 1 of 35
Next
Next10

The following table describes the labels in this screen.

Table 24 History Alarm: All

LABEL	DESCRIPTION
UP	Click **UP** to go to the **System Info** screen.
Show All	Select the radio button to display all alarms.
Show Alarm From To (YYYY/MM/DD)	Select the radio button and specify a range of time in the year/month/day format to display the alarms occur during this period only.
Apply	Click **Apply** to display the alarms (either all or from the time range you selected).
No	This is the index number of the alarm.

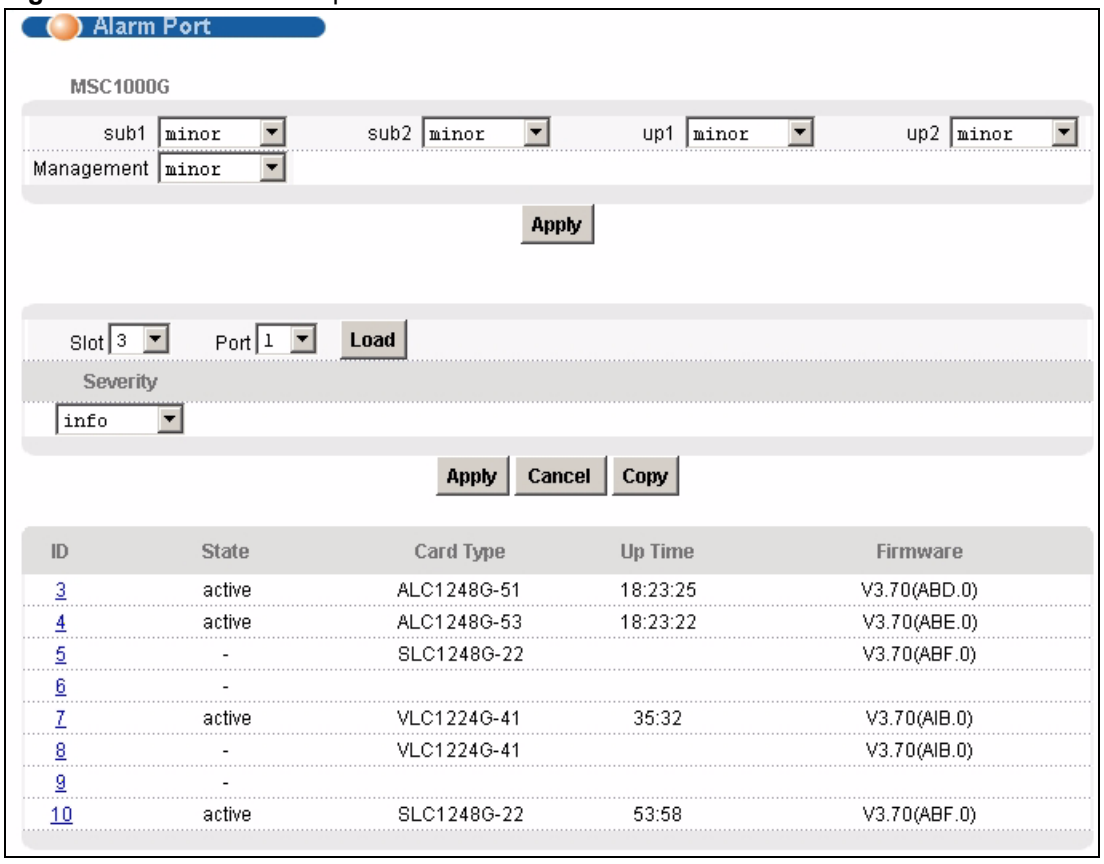
Table 24 History Alarm: All (continued)

LABEL	DESCRIPTION
Alarm	This is the alarm category.
Condition	This is the alarm condition.
Severity	This is the severity level of alarms.
TimeStamp	This is the time when the alarm occurred.
Source	This is the location where the alarm occurred.
Previous 10	Click **Previous 10** to show the preceding 10 alarms.
Previous Next	Click **Previous** or **Next** to show the preceding/following screen if the information cannot be displayed in one screen.
Next 10	Click **Next 10** to show the following 10 alarms.

6.3 Alarm Port Setup Screen

Use this screen to set the severity level of alarms to record on specified ports. Click **Alarm** > **Alarm Port Setup** to display the screen shown next.

Figure 51 Alarm Port Setup



The following table describes the labels in this screen.

Table 25 Alarm Port Setup

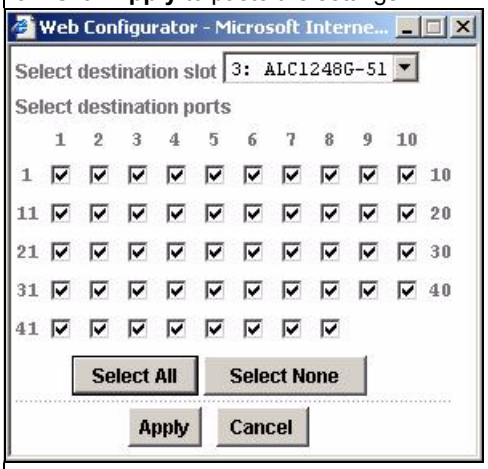
LABEL	DESCRIPTION
sub1 sub2 up1 up2 Management	Select the severity level from **info**, **minor**, **major** and **critical** for the alarms to record on the specified port of the MSC.
Apply	Click **Apply** to save the changes in this screen to the system's volatile memory. The system loses these changes if it is turned off or loses power, so use the **Config Save** on the navigation panel and then the **Save** button to save your changes to the non-volatile memory when you are done configuring.
Slot Port	Use the drop-down list boxes to select an DSL port on a line card for which you wish to configure the severity level.
Load	Click **Load** to refresh the whole screen.
Severity	Select the minimum severity level of alarms (**info**, **minor**, **major** or **critical**) that the system records on the port.
Apply	Click **Apply** to save the changes in this screen to the system's volatile memory. The system loses these changes if it is turned off or loses power, so use the **Config Save** on the navigation panel and then the **Save** button to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to begin configuring the screen again.
Copy	Do the following to copy settings from one port to another port or ports. 1. Select the **Select** radio button of the port from which you want to copy settings 2. Click **Copy**. 3. Select to which line card you want to copy the settings. 4. Select to which ports on the line card you want to copy the settings. Use **Select All** to select every port. Use **Select None** to clear all of the check boxes. 5. Click **Apply** to paste the settings. 
ID	This is the slot number of a line card. Click the index number of an active line card to display the **Alarm Port Setup Slot** screen where you can view and copy settings from one port to another port or ports on the selected line card.

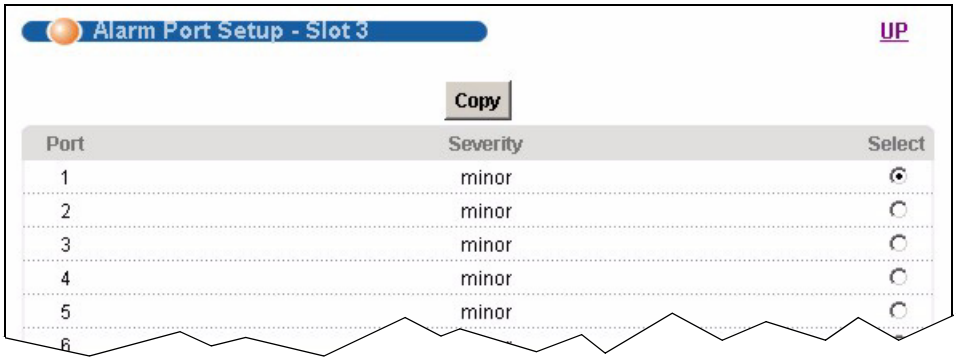
Table 25 Alarm Port Setup (continued)

LABEL	DESCRIPTION
State	This field displays the line card's current operational status. **active** means the line card is operating normally. **init** means the MSC1000G is initializing the line card. **disable** means a manager has disabled the line card. **inactive** means the line card is starting up or is not operating normally. This could be due to the card starting, a firmware upgrade in progress or a malfunction. See Section 34.6 on page 598 for what to do if the line card stays stuck in the inactive state.
Card Type	This field displays the type of a line card.
Up Time	This field displays how long the line card has been running since the last time it was started.
Firmware	This field displays the current firmware version installed on the line card.

6.3.1 Alarm Port Setup Slot Screen

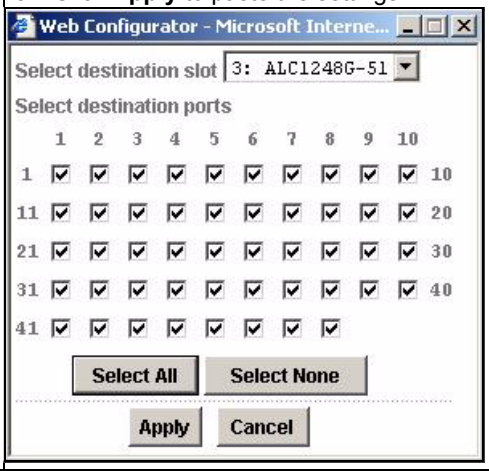
Click the slot number of a line card in the **Alarm Port Setup** screen to display the screen shown next.

Figure 52 Alarm Port Setup: Slot



The following table describes the labels in this screen.

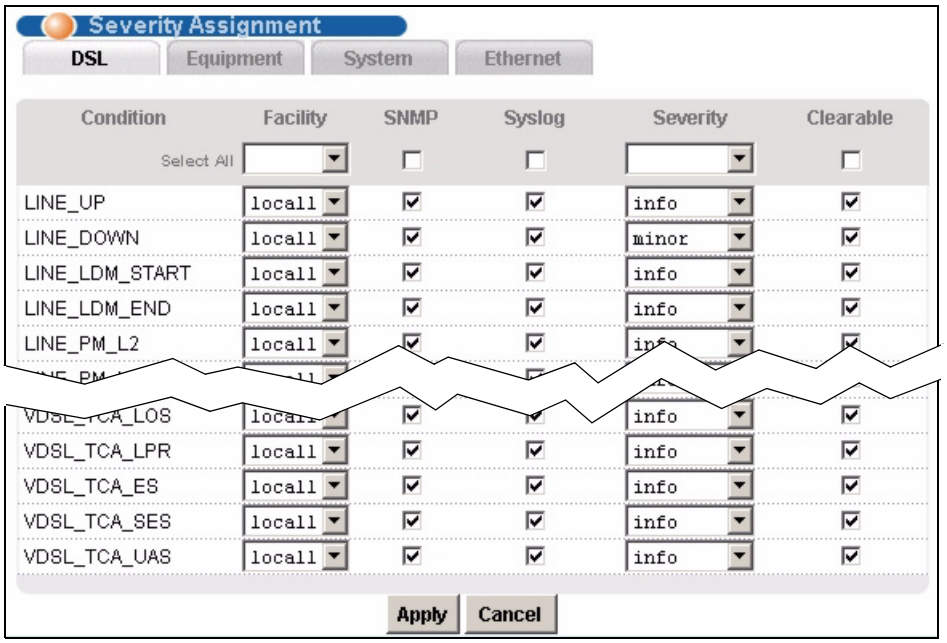
Table 26 Alarm Port Setup: Slot

LABEL	DESCRIPTION
UP	Click **UP** to go back to the previous screen.
Copy	Do the following to copy settings from one port to another port or ports. 1. Select the **Select** radio button of the port from which you want to copy settings 2. Click **Copy**. 3. Select to which line card you want to copy the settings. 4. Select to which ports on the line card you want to copy the settings. Use **Select All** to select every port. Use **Select None** to clear all of the check boxes. 5. Click **Apply** to paste the settings. 
Port	This field displays the number of the DSL port.
Severity	This field displays the minimum severity level of alarms that the system records on the port.
Select	Select the radio button of the port from which you want to copy settings.

6.4 Alarm Severity Assignment Screen

Click **Alarm > Alarm Severity Assignment** to configure the severity levels of individual alarms and where the system is to send them. Click a tab to view the alarms specific to an alarm category.

Figure 53 Alarm Severity Assignment: DSL



The following table describes the labels in this screen.

Table 27 Alarm Severity Assignment: DSL

LABEL	DESCRIPTION
Condition	This identifies an individual alarm. See Section 6.5 on page 119 for more information.
Facility	Select the log facility (local1~local7) to have the device log the syslog messages to a specific file in the syslog server. See your syslog program's documentation for details.
SNMP	Select the check box to have the switch send SNMP traps of the specified alarm condition.
Syslog	Select the check box to have the switch send syslog messages of the specified alarm condition.
Severity	Select the severity level from **minor**, **major** and **critical** for the specified alarm condition. You cannot change the severity level of the **info** severity level alarms.
Clearable	Select the check box to allow an administrator to manually remove records of the specified alarm.
Select All	Select an option from the **Select All** drop-down list box to automatically select that option for all entries. Alternatively, you may configure individual entries. Select a **Select All** check box to automatically select that option for all entries. Clear it to clear that option for all entries. Alternatively, you may select or clear the check boxes for individual entries.
Apply	Click **Apply** to save the changes in this screen to the system's volatile memory. The system loses these changes if it is turned off or loses power, so use the **Config Save** on the navigation panel and then the **Save** button to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to begin configuring the screen again.

6.5 Alarm Descriptions

This table describes the alarms on the MSC1000G.

- "ALC" is the ADSL Line Card.
- "SLC" is the SHDSL Line Card.
- "VLC" is the VDSL Line Card.
- "TCA" Stands for Threshold Crossed Alarm and indicates that an alarm profile threshold was exceeded.
- An "X" means that the alarm applies to the specific card.
- Atu-c refers to the IES-5000 or the downstream channel (for traffic going from the IES-5000 to the subscriber).
- Atu-r refers to subscriber or the upstream channel (for traffic coming from the subscriber to the IES-5000).

Table 28 Alarm Descriptions

ALARM	SEVERITY	MSC	ALC	SLC	VLC	DESCRIPTION
DSL						
LINE_UP	INFO		X	X		The line is up.
LINE_DOWN	MINOR		X	X		The line is down.
LINE_LDM_START	INFO		X			The line entered loop diagnosis mode.
LINE_LDM_END	INFO		X			The loop diagnostics were OK and the line left loop diagnosis mode.
LINE_PM_L2	INFO		X			The line went into power down L2 mode.
LINE_PM_L0	INFO		X			The line went into power down L0 mode.
LINE_FAIL	MAJOR		X	X		The line failed.
ADSL_TCA_LOL	INFO		X			The Loss Of Link seconds (<value>) within 15 minutes for the atu(c or r) has reached the threshold (<value>).
ADSL_TCA_LOF	INFO		X			The Loss Of Frame seconds (<value>) within 15 minutes for the atu(c or r) has reached the threshold (<value>).
ADSL_TCA_LOS	INFO		X			The Loss Of Signal seconds (<value>) within 15 minutes for the atu(c or r) has reached the threshold (<value>).
ADSL_TCA_LPR	INFO		X			The Loss of Power (<value>) of 15-minute interval of the atu(c or r) reaches threshold (<value>)
ADSL_TCA_ES	INFO		X			The Error Seconds (<value>) within 15 minutes for the atu(c or r) has reached the threshold (<value>).
ADSL_RATE_CHANGE	INFO		X			The transmission rate of the atu(c or r) changed from <value> to <value>.
ADSL_TCA_SES	INFO		X			The Severely Errored Seconds (<value>) within 15 minutes for the atu(c or r) has reached the threshold (<value>).
ADSL_TCA_UAS	INFO		X			The UnAvailable Seconds (<value>) within 15 minutes for the atu(c or r) has reached the threshold (<value>).

Table 28 Alarm Descriptions (continued)

ALARM	SEVERITY	MSC	ALC	SLC	VLC	DESCRIPTION
SHDSL_TCA_ATTEN	INFO			X		The loop attenuation (<value>) of the endpoint (unit address <value>-<side>-wire pair <value>) reached or exceeded the threshold (<value>).
SHDSL_TCA_SNRM	INFO			X		The SNR margin (<value>) of the endpoint (unit address <value>-<side>-wire pair <value>) reached or dropped below the threshold (<value>).
SHDSL_TCA_ES	INFO			X		The error seconds (<value>) of the endpoint (unit address <value>-<side>-wire pair <value>) reached or exceeded the threshold (<value>).
SHDSL_TCA_SES	INFO			X		The severely errored seconds (<value>) of the endpoint (unit address <value>-<side>-wire pair <value>) reached or exceeded the threshold (<value>).
SHDSL_TCA_CRC	INFO			X		The CRC anomalies (<value>) of the endpoint (unit address <value>-<side>-wire pair <value>) reached or exceeded the threshold (<value>).
SHDSL_TCA_LOSW	INFO			X		The Loss Of Sync Word seconds (<value>) of the endpoint (unit address <value>-<side>-wire pair <value>) reached or exceeded the threshold (<value>).
SHDSL_TCA_UAS	INFO			X		The UnAvailable Seconds (<value>) of the endpoint (unit address <value>-<side>-wire pair <value>) reached or exceeded the threshold (<value>)
VDSL_TCA_LOL	INFO				X	The Loss Of Link seconds (<value>) within 15 minutes for the atu(c or r) has reached the threshold (<value>).
VDSL_TCA_LOF	INFO				X	The Loss Of Frame seconds (<value>) within 15 minutes for the atu(c or r) has reached the threshold (<value>).
VDSL_TCA_LOS	INFO				X	The Loss Of Signal seconds (<value>) within 15 minutes for the atu(c or r) has reached the threshold (<value>).
VDSL_TCA_LPR	INFO				X	The Loss of Power (<value>) within 15 minutes for the atu(c or r) has reached the threshold (<value>).
VDSL_TCA_ES	INFO				X	The Error Seconds (<value>) within 15 minutes for the atu(c or r) has reached the threshold (<value>).
VDSL_TCA_SES	INFO				X	The Severely Errored Seconds (<value>) within 15 minutes for the atu(c or r) has reached the threshold (<value>).
VDSL_TCA_UAS	INFO				X	The UnAvailable Seconds (<value>) within 15 minutes for the atu(c or r) has reached the threshold (<value>).
Equipment						
DC_POWER_FAIL	CRITICAL	X				The -48VDC power -<index> failed.

Table 28 Alarm Descriptions (continued)

ALARM	SEVERITY	MSC	ALC	SLC	VLC	DESCRIPTION
VOLTAGE_ERROR	CRITICAL	X	X	X		The voltage <index> at input <value> is too low <value>, or high <value>.
TEMPERATURE_ERROR	CRITICAL	X	X	X		The temperature <index> at input <value> is too low <value> or high <value>.
FAN_ERROR	CRITICAL	X				The fan <index> speed <value> is too low <value> or high <value>
FAN_STOP_LOW_TEMP	MINOR	X				The fan stopped due to low temperature.
HW_MONITOR_FAIL	CRITICAL		X	X		A hardware monitor diagnosis test failed.
COLD_START	INFO	X				System cold-start.
WARM_START	INFO	X				System warm-start.
MGMT_ETHER_UP	INFO	X				The management Ethernet interface is up.
MGMT_ETHER_DOWN	MINOR	X				The management Ethernet interface is down.
ALARM_IN	CRITICAL	X				External alarm on input <index>.
SPT_TOPOLOGY_CHANG	MINOR	X				A spanning tree topology change was detected.
NT_FW_UPLOAD_OK	INFO	X				Firmware upload was successful.
NT_FW_UPLOAD_FAIL	MAJOR	X				Firmware upload failed.
LT_PLUG_IN	INFO	X				A line card was inserted into a slot.
LT_PULL_OUT	MAJOR	X				A line card was removed from a slot.
LT_DSL_DEVICE_FAIL	CRITICAL		X			A DSL chipset on an ALC failed.
LT_DSL_DEVICE_RELOAD	INFO		X			A DSL chipset on an ALC re-downloaded firmware <index>.
LT_ACTIVE	INFO	X				A line card became active.
LT_INACTIVE	MAJOR	X				A line card became inactive.
LT_FW_UPLOAD_OK	INFO	X	X	X		Firmware was successfully uploaded to a card.
LT_FW_UPLOAD_FAIL	MAJOR	X	X	X		Firmware upload to a card failed.
LT_ENABLE	INFO	X				Line card enabled.
LT_DISABLE	INFO	X				Line card disabled.
LT_RESET	INFO	X				Line card reset.
NT_SWITCH_OVER	MAJOR	X				The MSC1000G in standby mode becomes active.
CPU_UTIL_HIGH	MAJOR	X				The MSC1000G is overloading.
System						
REBOOT	INFO	X				The system restarted.
CONFIG_CHANGE	INFO	X				The system configuration has changed.
CONFIG_UPLOAD_OK	INFO	X				Uploading of the system configuration was successful.
CONFIG_UPLOAD_FAIL	MAJOR	X				Uploading of the system configuration failed.

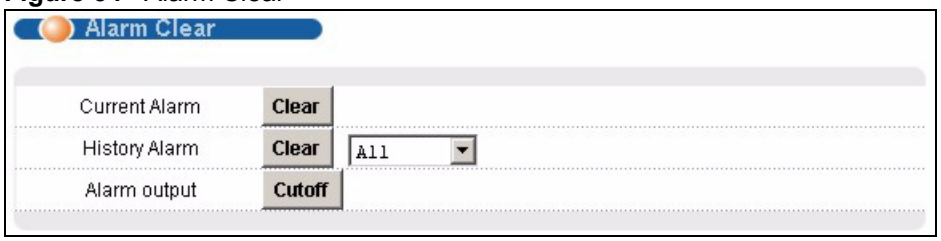
Table 28 Alarm Descriptions (continued)

ALARM	SEVERITY	MSC	ALC	SLC	VLC	DESCRIPTION
TIME_SYNC_FAIL	MINOR	X				Synchronizing the time with a timeserver failed.
ALARM_CUT_OFF	INFO	X				An administrator cutoff (canceled) an alarm.
ALARM_CLEAR	INFO	X				An administrator cleared the alarms.
LOGIN_FAIL	MINOR	X				A user failed to login.
LOGIN_OK	INFO	X				A user logged in successfully.
ACCOUNT_ADD	INFO	X				A user account was added.
ACCOUNT_DELETE	INFO	X				A user account was deleted.
ACCOUNT_MODIFY	INFO	X				A user's account was modified.
SVR_SYNC_PROF_OK	INFO	X				Server-initiated profile synchronization is successful.
SVR_SYNC_PROF_FAIL	INFO	X				Server-initiated profile synchronization failed.
CLI_SYNC_PROF_OK	INFO	X				Client-initiated profile synchronization is successful.
CLI_SYNC_PROF_FAIL	INFO	X				Client-initiated profile synchronization failed.
ANTI_SPOOFING	Minor	X				A system connected to the MSC1000G detected a MAC address connected to more than one port.
CLUSTER_MBR_ACTIVE	INFO	X				The cluster manager has established a connection with a particular cluster member.
CLUSTER_MBR_INACTIVE	INFO	X				The cluster manager has established a connection with a particular cluster member.
CLUSTER_MBR_ADD	INFO	X				The cluster manager added a member to a cluster.
CLUSTER_MBR_DELETE	INFO	X				The cluster manager removed a member from cluster.
Ethernet						
ENET_UP	INFO	X				One of the MSC1000G's Gigabit Ethernet interfaces is up.
ENET_DOWN	MINOR	X				One of the MSC1000G's Gigabit Ethernet interfaces is down.

6.6 Alarm Clear Screen

Click **Alarm > Alarm Clear** to open this screen where you can erase alarm entries.

Figure 54 Alarm Clear



The following table describes the labels in this screen.

Table 29 Alarm Clear

LABEL	DESCRIPTION
Current Alarm	Click **Clear** to manually remove the records of all the current alarms that are clearable.
History Alarm	Click **Clear** to manually remove the records of all the historical (past) alarms that are clearable. Use the drop-down list box to select the severity level of alarms that you want to remove.
Alarm output Cutoff	Click **Cutoff** to cancel an alarm. This stops the sending of the alarm signal current. This is useful in stopping an alarm if you have the alarm output connector pins connected to a visible or audible alarm. The alarm entry remains in the system.

7

Cluster Screens

This chapter covers how to configure cluster management.

7.1 Cluster Management Status Overview

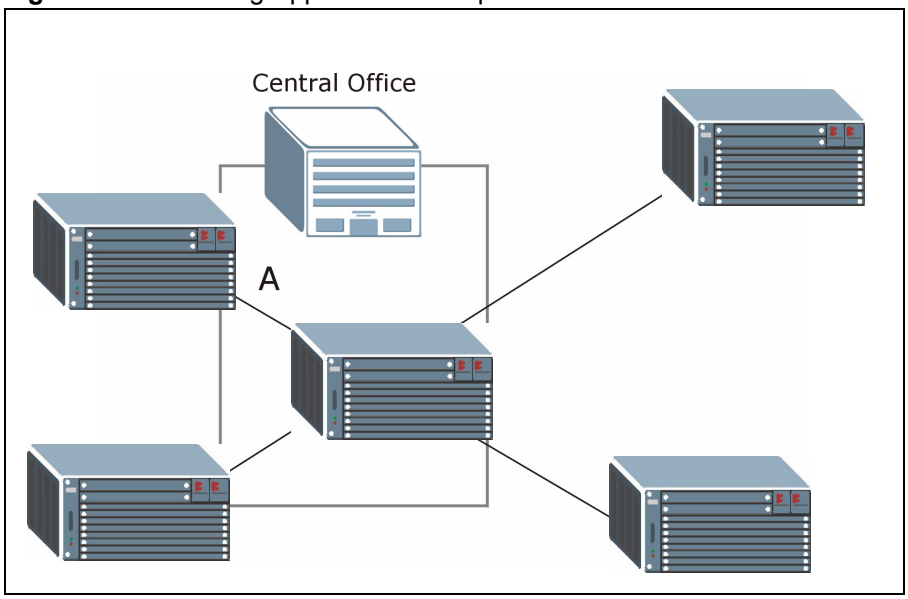
Cluster management allows you to manage multiple DSLAMs through one DSLAM, called the cluster manager. The DSLAMs must be directly connected and be in the same VLAN group so as to be able to communicate with one another.

Table 30 ZyXEL Cluster Management Specifications

Maximum number of cluster members	8
Cluster Member Models	Must be DSLAMs compatible with ZyXEL cluster management implementation.
Cluster Manager	The DSLAM through which you can access the web configurators of the cluster member DSLAMs.
Cluster Members	The DSLAMs (up to seven) being accessed through the cluster manager DSLAM.

In the following example, DSLAM **A** in the central office is the cluster manager and the other DSLAMs are cluster members.

Figure 55 Clustering Application Example

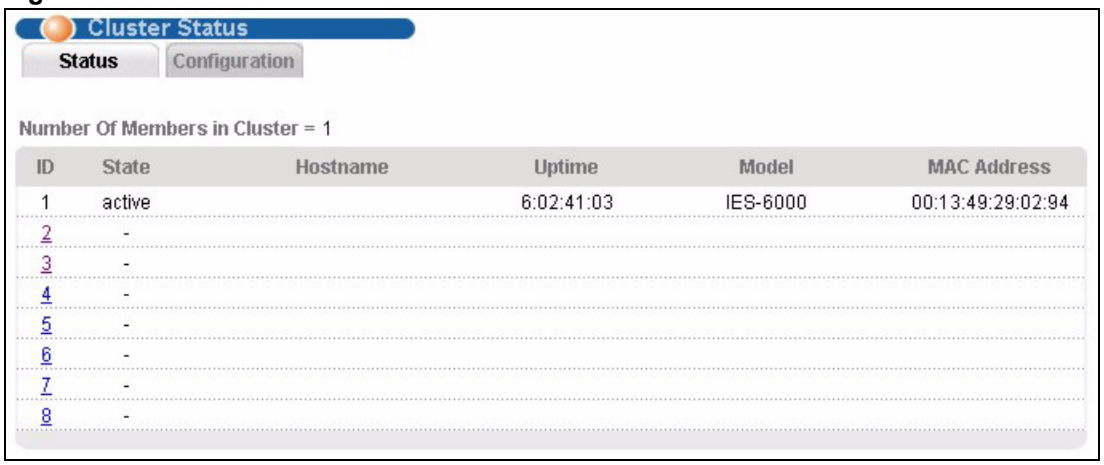


7.2 Cluster Management Status

Click **Cluster** in the navigation panel to display the following screen.

A cluster can only have one manager.

Figure 56 Cluster: Status



The following table describes the labels in this screen.

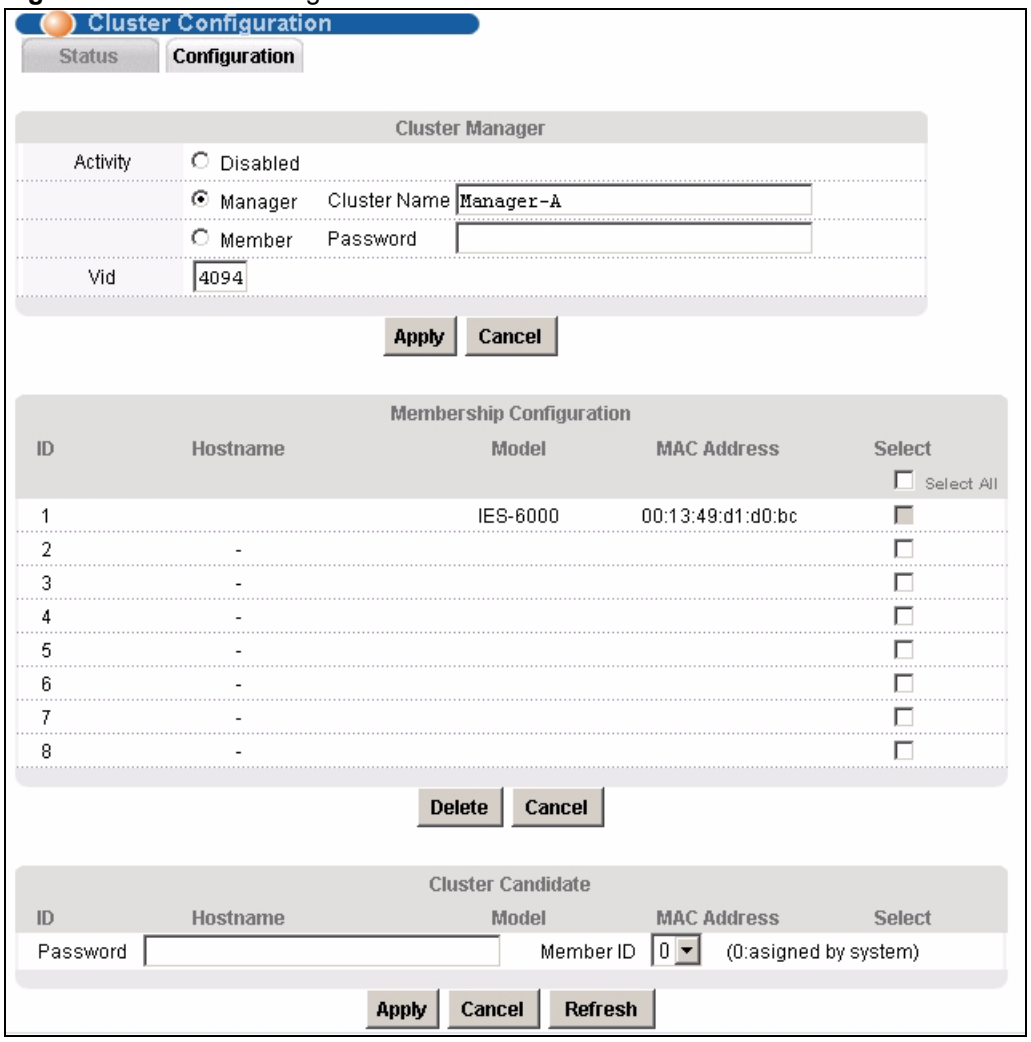
Table 31 Cluster: Status

LABEL	DESCRIPTION
Number of Members in Cluster	This is how many DSLAMs are in the management cluster (including the cluster manager).
ID	You can manage cluster member DSLAMs via the cluster manager DSLAM. The number for each cluster member is a hyperlink leading to the DSLAM's web configurator (see Figure 58 on page 129). ID 1 is the cluster manager.
State	This field displays the status of this DSLAM within the cluster. **active**: the manager can communicate with the member. **inactive**: the manager can not communicate with the member. **waiting**: the manager has sent a command to add the member and is waiting for a response. **error**: the member reported that the password was wrong. If a member DSLAM's management password changes, then it cannot be managed from the cluster manager and its **State** displays as **error.** You need to delete the member from the **Cluster > Configuration** screen's **Membership Configuration** list and re-add it from the **Cluster Candidate** list.
Hostname	This is the cluster DSLAM's **System Name**.
Uptime	This field displays how long the DSLAM has been turned on and in the cluster.
Model	This field displays the model name of the DSLAM.
MacAddr	This is the DSLAM's hardware MAC address.

7.3 Cluster Management Configuration

Use this screen to configure cluster management settings. Click **Cluster > Configuration** to display the next screen.

Figure 57 Cluster: Configuration



The following table describes the labels in this screen.

Table 32 Cluster: Configuration

LABEL	DESCRIPTION
Cluster Manager	
Activity	Select **Disabled** to have this DSLAM not function as part of the cluster. Select **Manager** to have this DSLAM become the cluster manager DSLAM. A cluster can only have one manager. Other cluster managers do not display in the **Cluster Candidate** list. Select **Member** to have this DSLAM become a cluster member so it can be managed through the cluster manager. If a DSLAM that was previously a cluster member is later set to become a cluster manager, then its **Status** is displayed as **Error** in the old cluster manager's **Cluster > Status** screen and a warning icon (⚠) appears in the **Cluster > Configuration** screen's **Membership Configuration** list. You need to change the cluster configuration of the old cluster member.
Cluster Name	Type a name to identify the cluster. You may use up to 32 printable characters. Spaces are not allowed.
Password	Each cluster member's password is its management password. When you set a DSLAM to be a cluster member, enter its management password.
Vid	This is the cluster management VLAN ID. The cluster's DSLAMs must be directly connected and in the same VLAN group. The cluster management VID must be different from the management VID.
Apply	Click **Apply** to save the changes in this section of the screen to the system's volatile memory. The system loses these changes if it is turned off or loses power, so use the **Config Save** on the navigation panel and then the **Save** button to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to begin configuring the screen again.
Membership Configuration	The following table lists the DSLAMs that the cluster manager has added to the cluster.
ID	This is the index number of a cluster member.
Hostname	This is the cluster DSLAM's **System Name**.
Model	This field displays the device's model name.
MAC Address	This is the DSLAM's hardware MAC address.
Select	Select this check box (or use **Select All** to select every check box) and then click the **Delete** button to remove a cluster member from the cluster.
Cancel	Click **Cancel** to reset the fields.
Cluster Candidate	The MSC1000G finds potential cluster member DSLAMs by auto-discovery and lists them here. The DSLAMs must be directly connected and in the same VLAN group. You must have also logged into that device and configured it as a cluster member. A device can only be part of one cluster at a time. If a device is already in another cluster, it does not display here. Devices that are set to be cluster managers will not be visible.
ID	This is the index number of a cluster member candidate.
Hostname	This is the cluster DSLAM's **System Name**.
Model	This field displays the device's model name.
MAC Address	This is the DSLAM's hardware MAC address.

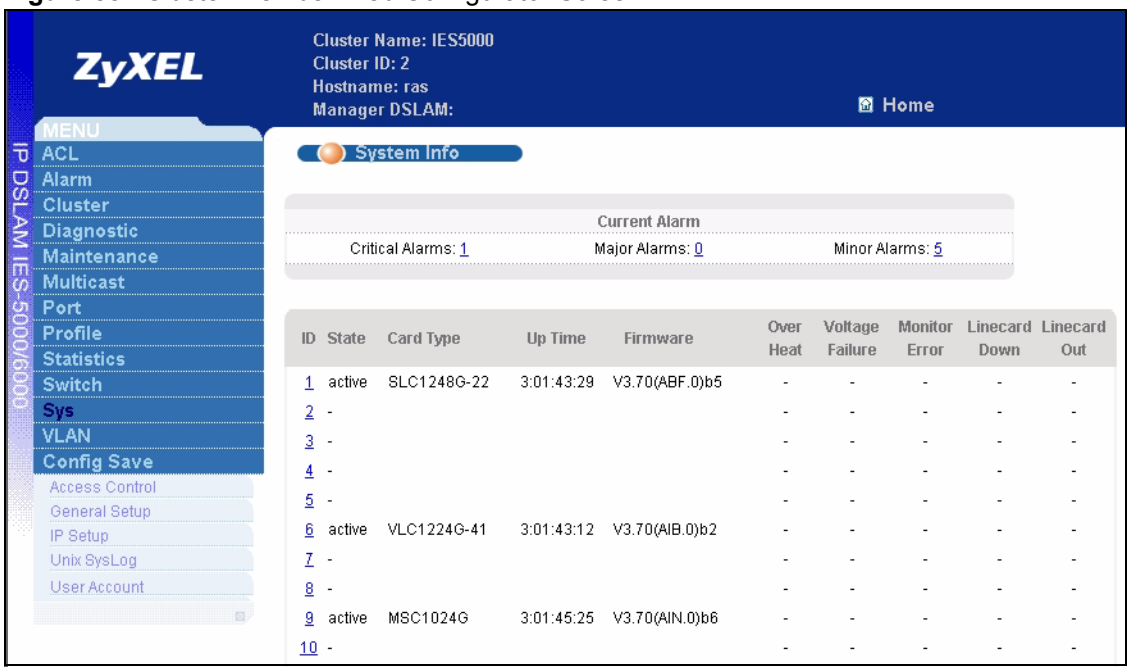
Table 32 Cluster: Configuration (continued)

LABEL	DESCRIPTION
Select	Select this check box and then configure the **Password** and the **Member ID** fields and click the **Apply** button to add a cluster member candidate to the cluster.
Password	Each cluster member's password is its management password. When you select a DSLAM to be a cluster member, enter its management password. If a member DSLAM's management password changes, then it cannot be managed from the cluster manager. Its **State** displays as **Error** in the **Cluster > Status** screen and a warning icon (⚠) appears in the **Cluster > Configuration** screen's **Membership Configuration** list. You need to delete the member from the **Membership Configuration** list and re-add it from the **Cluster Candidate** list.
Member ID	This is the index number of a cluster member.
Apply	Click **Apply** to add a cluster member candidate to the cluster. The MSC1000G checks the password with the device. The changes in this section of the screen are saved to the system's volatile memory. The system loses these changes if it is turned off or loses power, so use the **Config Save** on the navigation panel and then the **Save** button to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to reset the fields.
Refresh	Click **Refresh** to update the list of suitable candidates found by auto-discovery.

7.3.1 Cluster Member Management

Click **Cluster > Status** screen of the cluster manager and then click an **Index** hyperlink from the list of members to go to that cluster member's web configurator. The top of the cluster member's web configurator screen displays cluster information.

Figure 58 Cluster Member Web Configurator Screen



The following table describes the labels at the top of the screen.

Table 33 Cluster Member Web Configurator Screen

LABEL	DESCRIPTION
Cluster Name	This is the name of the cluster.
Cluster ID	This is the VLAN ID that the cluster uses and is only applicable if the manager DSLAM is set to use IEEE 802.1Q VLAN. All DSLAMs must be directly connected and in the same VLAN group to belong to the same cluster. This field is ignored if the clustering manager is using port-based VLAN.
Hostname	This is the cluster member DSLAM's **System Name**.
Manager DSLAM	This is the cluster manager DSLAM's **System Name**.

8

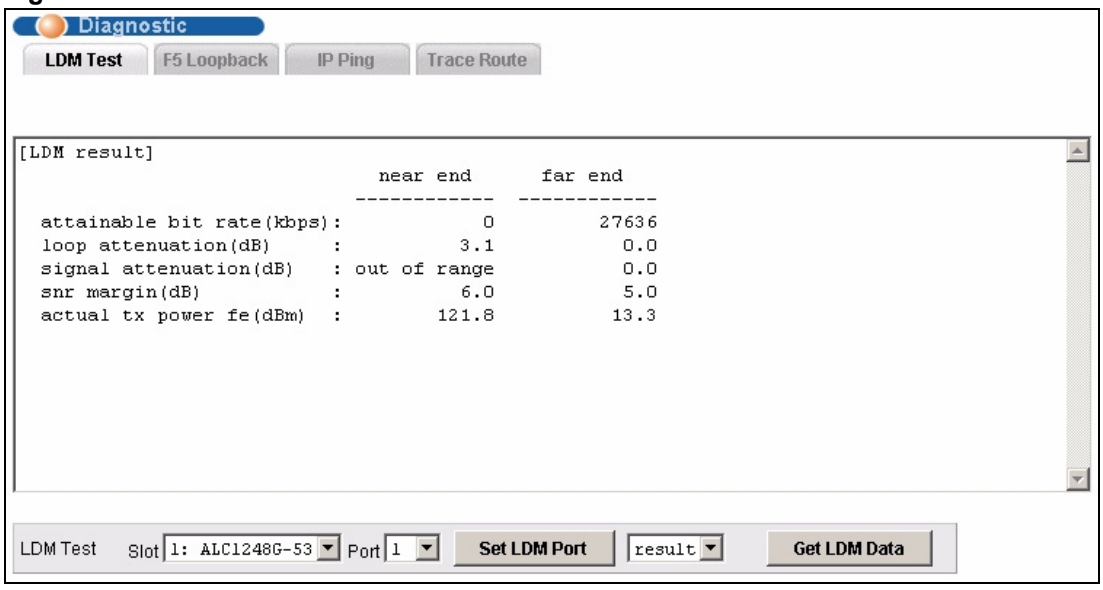
Diagnostic Screens

This chapter explains the **Diagnostic** screens.

8.1 LDM Test Screen (DELT)

Click **Diagnostic > LDM** in the navigation panel to display this screen. Use this screen to perform loop diagnostics (LDM stands for Loop Diagnostic Mode) on an ADSL port. This is a Dual End Loop Test (DELT). A DELT provides details about the line condition. The subscriber device must also support DELT in order to perform this. This feature is applicable for ALC line cards only.

Figure 59 LDM Test



The following table describes the labels in this screen.

Table 34 LDM Test

LABEL	DESCRIPTION
LDM Test	Select slot and port numbers from the **Slot** and **Port** drop-down list boxes and click **Set LDM Port** to perform loop diagnostics on the specified port. Only slots with an active ADSL line card display in the **Slot** drop-down list box. The ADSL port must be set to ADSL2 or ADSL2+ ADSL operational mode and have a connection. It takes about one minute for the loop diagnostics to finish. The screen displays a message confirming upon which ADSL port loop diagnostics will be performed. Click **Get LDM Data** to display the loop diagnostics results after using the **Set LDM Port** button on an ADSL port. Use the loop diagnostics results to analyze problems with the physical ADSL line. Note: Wait at least one minute after using **Set LDM Port** before using **Get LDM Data**.

8.1.1 Loop Diagnostics Test Parameters

The following table lists the loop diagnostics test parameters that display, see the ITU-T's G.992.3 for more information.

Table 35 Loop Diagnostics Test Parameters

LABEL	DESCRIPTION
near end	This column of diagnostics results is for the upstream traffic (coming from the subscriber to the IES-5000).
far end	This column of diagnostics results is for the downstream traffic (going from the IES-5000 to the subscriber).
attainable bit rate (kbps)	This is the upstream and downstream attainable net data rate in Kilobits/s.
loop attenuation (dB)	This is the upstream and downstream line attenuation, measured in decibels (dB). Loop attenuation is the difference between the power transmitted at the near-end and the power received at the far-end. Loop attenuation is affected by the channel characteristics (wire gauge, quality, condition and length of the physical line).
signal attenuation (dB)	This is the upstream and downstream signal attenuation (reductions in amplitude of the DSL signal). It is measured in decibels (dB). Signal attenuation is affected by factors such as noise, heat, crosstalk and loop attenuation.
snr margin (dB)	This is the upstream and downstream Signal-to-Noise Ratio margin (in dB). A DMT sub-carrier's SNR is the ratio between the received signal power and the received noise power. The signal-to-noise ratio margin is the maximum that the received noise power could increase with the system still being able to meet its transmission targets.
actual tx power fe (dBm)	This is the upstream and downstream far end actual aggregate transmit power (in dBm)

8.2 F5 Loopback Screen

Click **Diagnostic > F5 Loopback** in the navigation panel to display this screen. Use this screen to perform loopback tests.

Figure 60 F5 Loopback

The following table describes the labels in this screen.

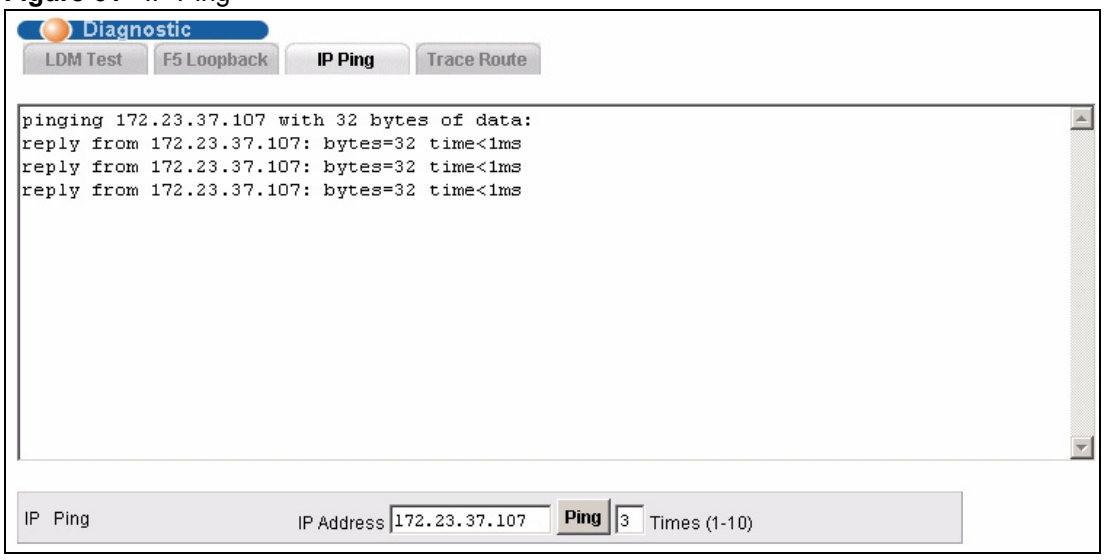
Table 36 F5 Loopback

LABEL	DESCRIPTION
F5 Loopback	Select slot and port numbers from the **Slot** and **Port** drop-down list boxes and enter a VPI/VCI to specify a PVC. Click **test** to perform an OAMF5 loopback test on the specified DSL port. An Operational, Administration and Maintenance Function 5 test is used to test the connection between two DSL devices. First, the DSL devices establish a virtual circuit. Then the local device sends an ATM F5 cell to be returned by the remote DSL device (both DSL devices must support ATM F5 in order to use this test). The results (“Passed” or “Failed”) display in the multi-line text box.

8.3 IP Ping Screen

Click **Diagnostic > IP Ping** in the navigation panel to display this screen. Use this screen to ping IP addresses.

Figure 61 IP Ping



The following table describes the labels in this screen.

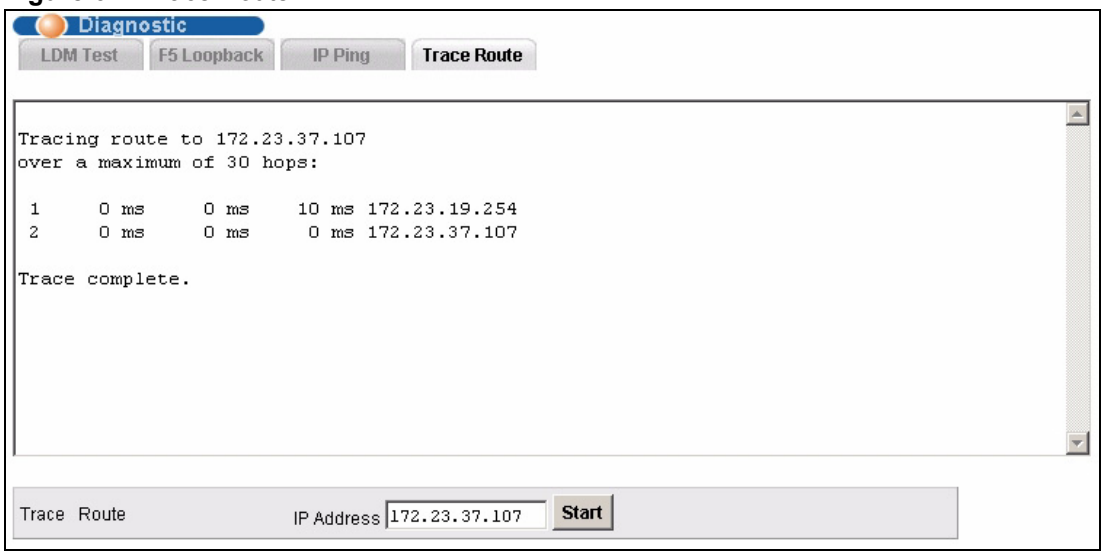
Table 37 IP Ping

LABEL	DESCRIPTION
IP Ping	Type the IP address of a device that you want to ping in order to test a connection. In the field to the right specify the number of times that you want to ping the IP address. Click **Ping** to ping the IP address that you specified.

8.4 Trace Route Screen

Click **Diagnostic > Trace Route** in the navigation panel to display this screen. Use this screen to show the path that packets take from the system to a specific IP address.

Figure 62 Trace Route



The following table describes the labels in this screen.

Table 38 Trace Route

LABEL	DESCRIPTION
Trace Route	Type the IP address of a device. Click **Start** to perform a trace route in order to check the path that packets take to get to the IP address that you specified.

9

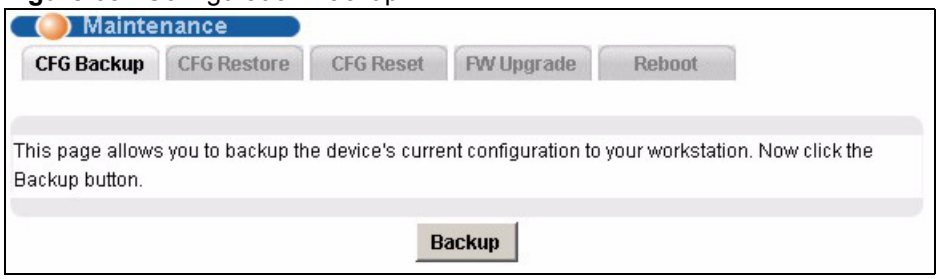
Maintenance Screens

This chapter explains how to use the maintenance screens.

9.1 Configuration Backup Screen

Click **Maintenance > Config Backup** in the navigation panel to open the following screen. Use this screen to back up your system configuration. This allows you to create various "snap shots" of your device from which you may restore at a later date.

Figure 63 Configuration Backup



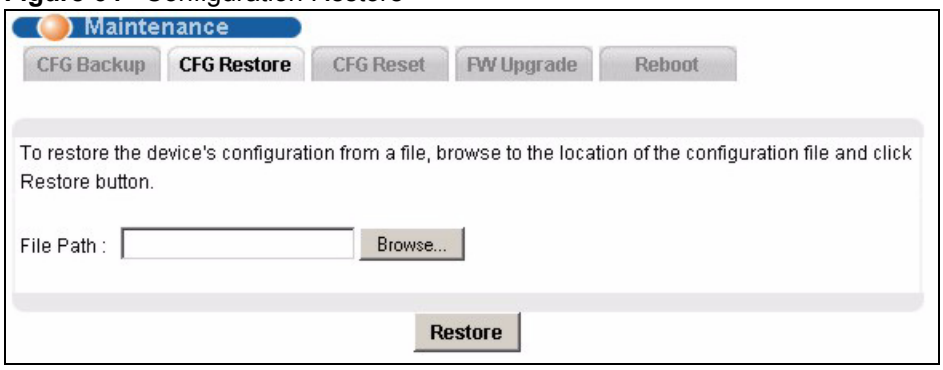
1. Click **Backup** to save your device's configuration to your computer.
2. In the **Save As** screen, choose a location to save the file on your computer from the **Save in** drop-down list box and type a descriptive name for it in the **File name** list box. Click **Save** to save the configuration file to your computer.

You can change the ".dat" file to a ".txt" file and still upload it to the system. See the chapters on commands to edit the configuration text file.

9.2 Configuration Restore Screen

Click **Maintenance > Config Restore** in the navigation panel to open the following screen. Use this screen to load a configuration file from your computer to the system.

Figure 64 Configuration Restore

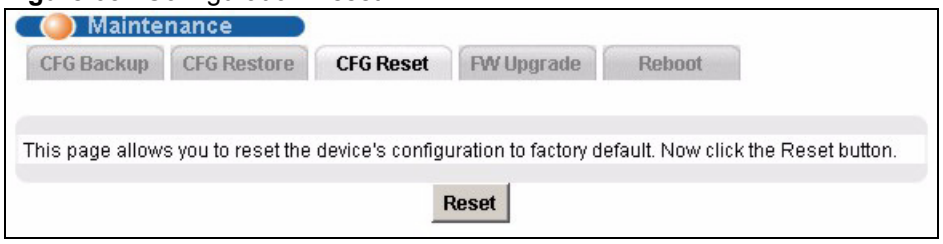


Type the path and file name of the configuration file you wish to restore in the **File Path** text box or click **Browse** to display a **Choose File** screen from which you can locate it. After you have specified the file, click **Restore**. "conf-0" is the name of the configuration file on the system, so your backup configuration file is automatically renamed when you restore using this screen.

9.3 Configuration Reset Screen

Click **Maintenance > Config Reset** in the navigation panel to open the following screen. Use this screen to clear all system configuration information that you have configured and return to the factory defaults.

Figure 65 Configuration Reset

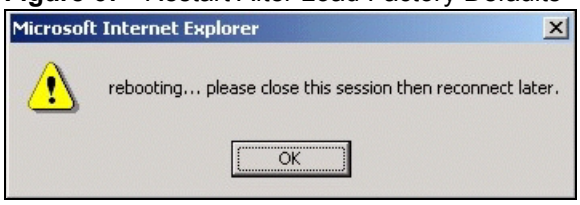


Click **Reset** to return the system to the factory default settings.

Figure 66 Confirm Restore Factory Default Settings

Click **OK** to begin resetting all system configurations to the factory defaults and then wait for the system to restart. This takes up to two minutes. If you want to access the web configurator again, you may need to change the IP address of your computer to be in the same subnet as that of the default system IP address (192.168.1.1 for in-band, 192.168.0.1 for out-of-band).

Figure 67 Restart After Load Factory Defaults

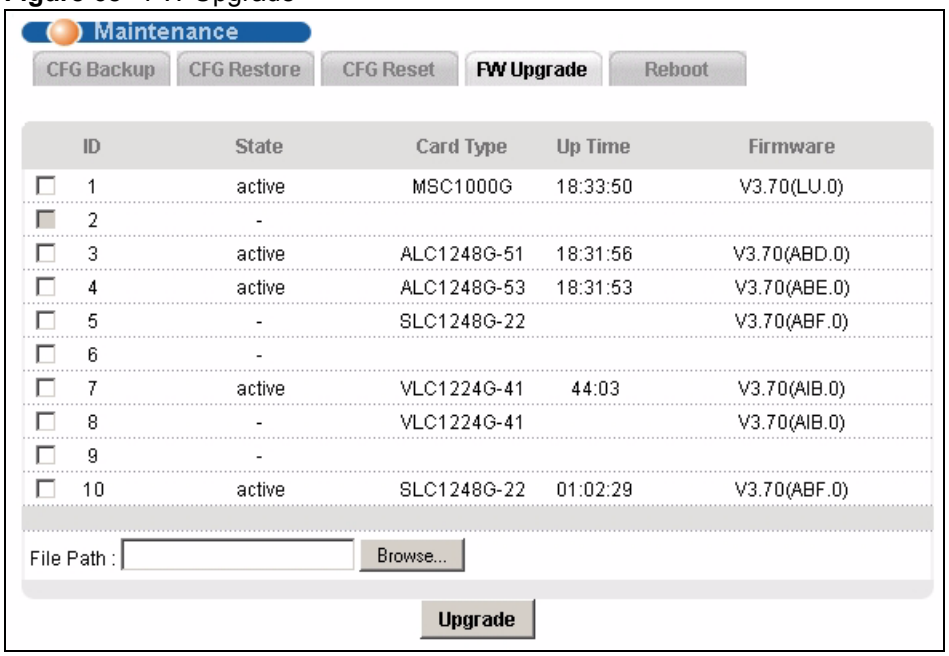


9.4 Firmware Upgrade Screen

Click **Maintenance > Firmware Upgrade** in the navigation panel to open the following screen. Use this screen to view your current firmware version number and upload firmware to cards in the system. Make sure you have downloaded (and unzipped) the correct model firmware and version to your computer before uploading to the card.

Be sure to upload the correct model firmware as uploading the wrong model firmware may damage a card.

Figure 68 FW Upgrade



Select the check boxes beside the card or cards to which you want to upload firmware. You can simultaneously upload firmware to cards of the same type. You can only upload firmware to cards that are active.

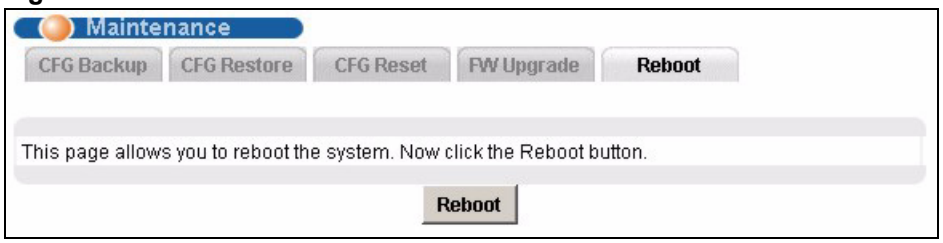
Type the path and file name of the firmware file you wish to upload in the **File Path** text box or click **Browse** to locate it. After you have specified the file, click **Upgrade**.

After the firmware upgrade process is complete, use this screen to verify your current firmware version number.

9.5 Reboot Screen

Click **Maintenance > Reboot** in the navigation panel to open the following screen. Use this screen to restart the system without physically turning the power off.

Figure 69 Reboot



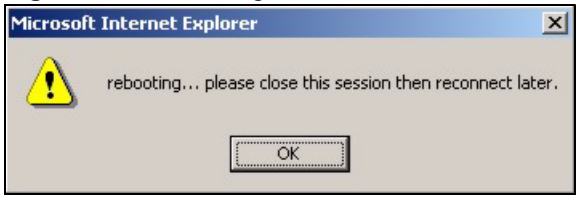
Use the **Config Save** screen first if you want to save the system's current configuration. Otherwise, using the **Reboot** button will return the system to the configuration that was last saved to nonvolatile memory.

Click the **Reboot** button to display the following screen.

Figure 70 Confirm Restart

Click **OK**.

Figure 71 Rebooting



Click **OK** again and wait for the system to restart. This takes up to two minutes.

10

Multicast Screens

This chapter describes the **Multicast** screens.

10.1 IGMP Introduction

Traditionally, IP packets are transmitted in one of either two ways - Unicast (1 sender to 1 recipient) or Broadcast (1 sender to everybody on the network). Multicast delivers IP packets to just a group of hosts on the network.

IGMP (Internet Group Multicast Protocol) is a network-layer protocol used to establish membership in a multicast group - it is not used to carry user data. Refer to RFCs 1112, 2236 and 3376 for information on IGMP versions 1, 2 and 3 respectively.

10.1.1 IP Multicast Addresses

In IPv4, a multicast address allows a device to send packets to a specific group of hosts (multicast group) in a different sub-network. A multicast IP address represents a traffic receiving group, not individual receiving devices. IP addresses in the Class D range (224.0.0.0 to 239.255.255.255) are used for IP multicasting. Certain IP multicast numbers are reserved by IANA for special purposes (see the IANA web site for more information).

10.1.2 IGMP Snooping

A layer-2 switch can passively snoop on IGMP Query, Report and Leave (IGMP versions 2 and 3) packets transferred between IP multicast routers/switches and IP multicast hosts to learn the IP multicast group membership. It checks IGMP packets passing through it, picks out the group registration information, and configures multicasting accordingly. IGMP snooping allows the system to learn multicast groups without you having to manually configure them.

The system forwards multicast traffic destined for multicast groups (that it has learned from IGMP snooping or that you have manually configured) to ports that are members of that group. The system discards multicast traffic destined for multicast groups that it does not know. IGMP snooping generates no additional network traffic, allowing you to significantly reduce multicast traffic passing through your device.

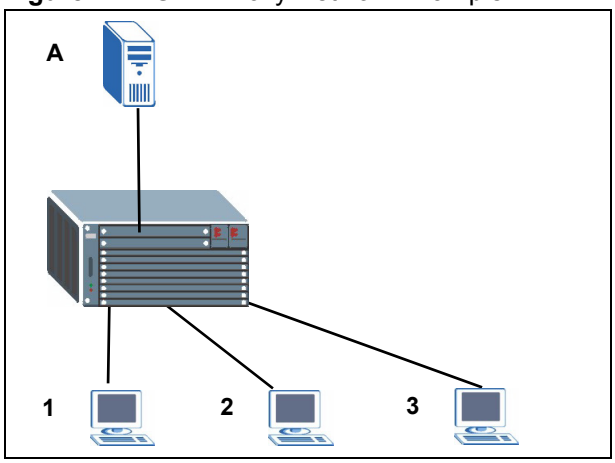
10.1.3 IGMP Proxy

To allow better network performance, you can use IGMP proxy instead of a multicast routing protocol in a simple tree network topology.

In IGMP proxy, an upstream interface is the port that is closer to the source (or the root of the multicast tree) and is able to receive multicast traffic. There should only be one upstream interface (also known as the query port) on the system to limit bandwidth use. A downstream interface is a port that connects to a host (such as a computer). A query VLAN determines which ports are downstream interfaces.

The following figure shows a network example where A is the multicast source while computers 1, 2 and 3 are the receivers. In the figure A is connected to the upstream interface and 1, 2 and 3 are connected to the downstream interface.

Figure 72 IGMP Proxy Network Example



The system will not respond to IGMP join and leave messages on the upstream interface. The system only responds to IGMP query messages on the upstream interface. The system sends IGMP query messages to the hosts that are members of the query VLAN.

The system only sends an IGMP leave messages via the upstream interface when the last host leaves a multicast group.

One of the Ethernet ports acts as the upstream interface. By default, the DSL ports are set as the downstream interfaces.

The switch does not allow a subscriber port to send multicast traffic (except static multicast traffic) to an uplink port. Only the uplink port can forward multicast traffic to the subscriber port(s).

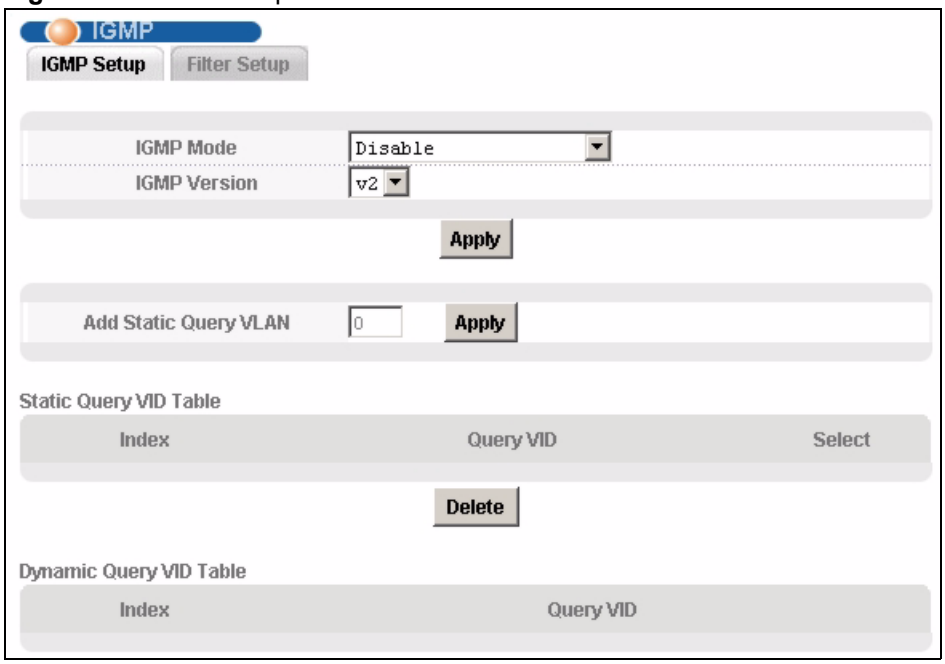
10.1.4 IGMP Snooping and Proxy Note

The IES-5000 acts as an IGMPv3 client host for an edge IGMPv3 multicast router and as a IGMPv2/v3 router for IGMPv2/v3 client hosts (subscribers). The IES-5000 can recognize IGMPv3 protocol messages and forward them towards the IGMP multicast router. It does not support full-featured IGMPv3 functions like source IP address control specified in RFC 3376.

10.2 IGMP Setup Screen

Click **Multicast > IGMP** in the navigation panel to display the screen shown next. Use this screen to configure your IGMP settings.

Figure 73 IGMP Setup



The following table describes the labels in this screen.

Table 39 IGMP Setup

LABEL	DESCRIPTION
IGMP Mode	Select **Enable_IGMP_Snooping** to have the system passively learn multicast groups. Select **Enable_IGMP_Proxy** to have the system proxy multicast traffic. Select **Disable** to have the system not use either IGMP proxy or snooping.
IGMP Version	Select which version of IGMP you want the system to support. Select IGMPv2 (**V2**) or IGMPv3 (**V3**). If you select IGMPv2, the system discards IGMPv3 packets. This provides better security if none of the devices in the network use IGMPv3. If you select IGMPv3, the system recognizes both IGMPv2 and IGMPv3.
Add Static Query VID	Type the number for an IGMP proxy VLAN and click **Apply** to add a static VLAN on which the system sends IGMP query messages. This should be the number of a subscriber VLAN. The VLAN will appear in the **Static Query VID Table**. You must configure the system's VLAN settings before you can set static query VIDs.
Static Query VID Table	This table lists the manually added VLANs on which the system sends IGMP query messages. These are multicast service subscriber VLANs. Click **Delete** to remove the selected entry.
Dynamic Query VID Table	This table lists the IGMP query VLANs that the system has dynamically learned via IGMP snooping or IGMP proxy. These are VLANs on which the system sends IGMP query messages. They are multicast service subscriber VLANs.

10.3 IGMP Filtering

With the IGMP filtering feature, you can set which IGMP groups a subscriber on a port can join. This allows you to control the distribution of multicast services (such as content information distribution) based on service plans and types of subscription.

You can set the device to filter the multicast group join reports on a per-port basis by configuring an IGMP filtering profile and associating the profile to a port.

10.4 IGMP Filter Setup Screen

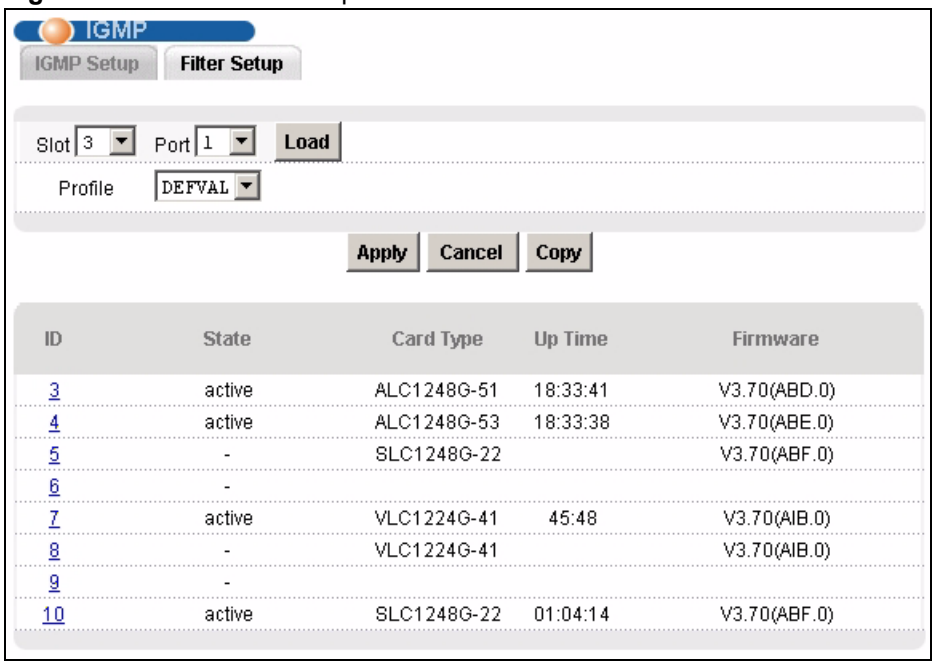
You can use the IGMP filter profiles to control access to a service that uses a specific multicast group (like a SIP server for example). Configure an IGMP filter profile that allows access to that multicast group. Then assign the IGMP filter profile to ADSL ports that are allowed to use the service.

Click **Multicast > IGMP > Filter Setup** to open the following screen.

The DEFVAL IGMP filter profile is assigned to all of the DSL ports by default. It allows a port to join all multicast IP addresses (224.0.0.0~239.255.255.255). If you want to allow an DSL subscriber access to only specific IGMP multicast groups, use the **IGMP Filter Profile** screen to configure a different profile and then use the **IGMP Filter Setup** screen to assign it to the subscriber's DSL port.

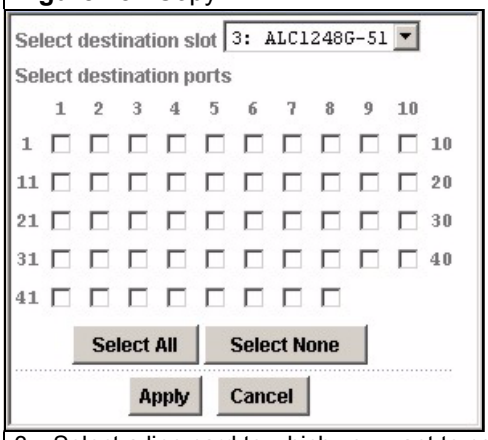
Use the top of the screen to set the IGMP filter profile that an individual DSL port (or entire slot) uses. Click an ID number in the bottom part of the screen to go to a screen where you can copy a DSL port's IGMP filter profile setting to another DSL port.

Figure 74 IGMP Filter Setup



The following table describes the labels in this screen.

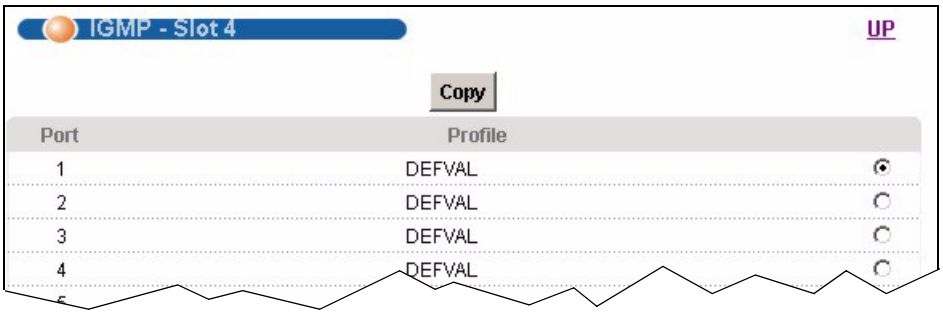
Table 40 IGMP Filter Setup

LABEL	DESCRIPTION
Slot	Select the number of a line card's slot.
Port	Select the number of a DSL port on the line card.
Load	Click **Load** to retrieve the port's IGMP filter profile setting and display it in the **Profile** drop-down list box.
Profile	Select an IGMP filtering profile.
Apply	Click **Apply** to have the specified DSL port use the selected IGMP filter profile.
Cancel	Click **Cancel** to set the fields back to the settings that you last retrieved.
Copy	Do the following to copy settings from one DSL port to another DSL port or ports. 1. Use the **Slot** and **Port** drop-down list boxes and the **Load** button to select the number of the DSL port from which you want to copy IGMP filter profile settings. 2. Click **Copy** to open the following screen. **Figure 75** Copy  3. Select a line card to which you want to copy settings. 4. Select the check boxes of the DSL ports on the line card to which you want to copy the IGMP filter profile setting. Click **Select All** to mark all of the port check boxes or click **Select None** to clear all of the port check boxes. 5. Click **Apply** to copy the IGMP filter settings to all of the ports that you have selected in this screen. Click **Cancel** to close the screen without saving changes.
ID	This column lists the slot numbers of the line cards. Click the ID number of an active line card to go to a screen where you can copy a DSL port's IGMP filter profile setting to another DSL port.
State	This field displays the line card's current operational status. **active** means the line card is operating normally. **init** means the MSC1000G is initializing the line card. **disable** means a manager has disabled the line card. **inactive** means the line card is starting up or is not operating normally. This could be due to the card starting, a firmware upgrade in progress or a malfunction. See Section 34.6 on page 598 for what to do if the line card stays stuck in the inactive state.
Card Type	This field displays the type of a line card.
Up Time	This field displays how long the line card has been running since the last time it was started.
Firmware	This field displays the current firmware version installed on the line card.

10.4.1 IGMP Filter Setup Slot Screen

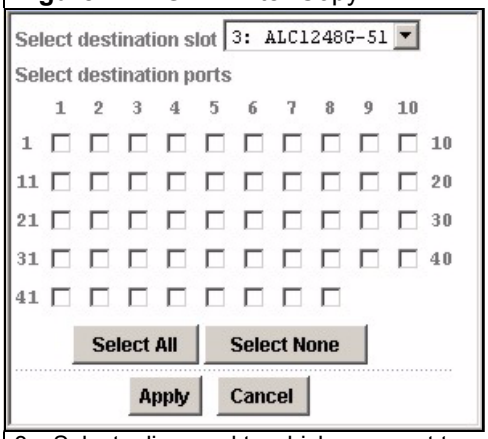
Click **Multicast > IGMP > Filter Setup** and then the slot number of an active line card to open the following screen.

Figure 76 IGMP Filter Setup: Slot



The following table describes the labels in this screen.

Table 41 IGMP Filter Setup: Slot

LABEL	DESCRIPTION
UP	Click this to return to the **IGMP Filter Setup** screen.
Port	These are the numbers of the DSL ports on the line card.
Profile	This is the IGMP filtering profile that a DSL port is currently set to use.
Copy	Do the following to copy IGMP filter settings from one DSL port to another DSL port or ports. 1. Select the radio button of the DSL port from which you want to copy IGMP filter profile settings. 2. Click **Copy** to open the following screen. **Figure 77** IGMP Filter Copy  3. Select a line card to which you want to copy settings. 4. Select the check boxes of the DSL ports on the line card to which you want to copy the IGMP filter profile setting. Click **Select All** to mark all of the port check boxes or click **Select None** to clear all of the port check boxes. 5. Click **Apply** to copy the IGMP filter settings to all of the ports that you have selected in this screen. Click **Cancel** to close the screen without saving changes.

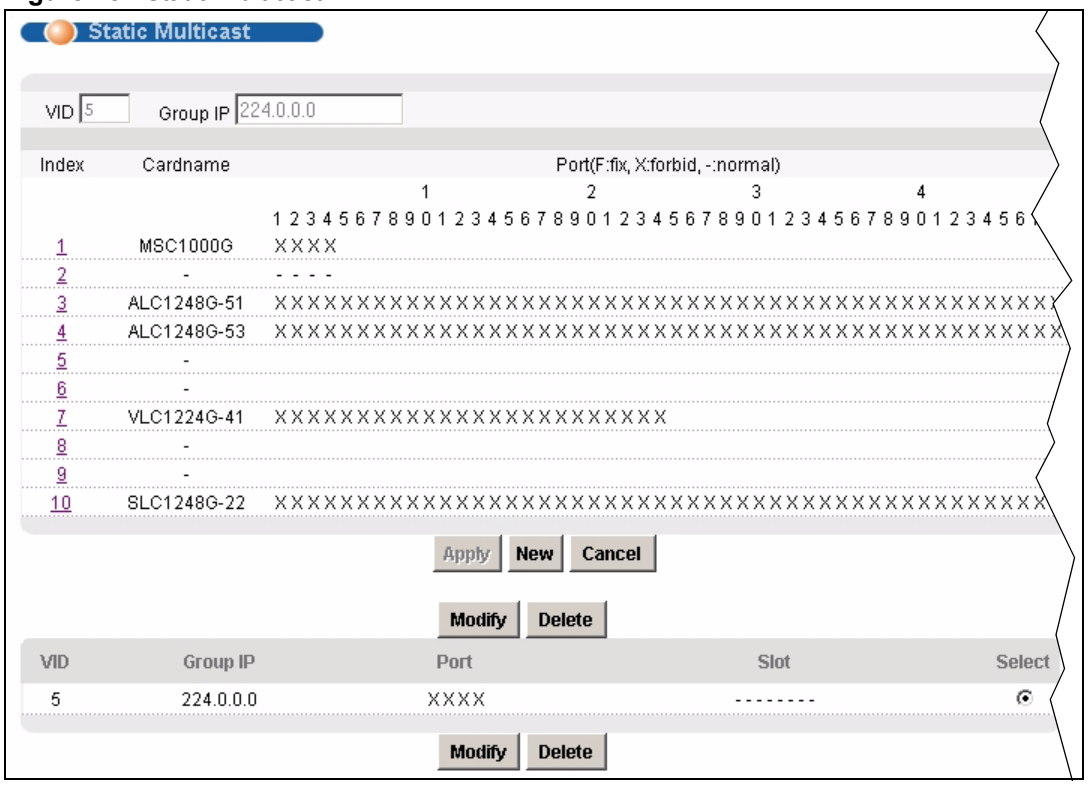
10.5 Static Multicast

Use static multicast to allow incoming frames based on multicast MAC address(es) that you specify. This feature can be used in conjunction with IGMP snooping to allow multicast MAC address(es) that are not learned by IGMP snooping or IGMP proxy. Use static multicast to pass routing protocols, such as RIP and OSPF.

10.6 Static Multicast Screen

Click **Multicast > Static Multicast** in the navigation panel to display the screen shown next.

Figure 78 Static Multicast



The following table describes the related labels in this screen.

Table 42 Static Multicast

LABEL	DESCRIPTION
VID	Type the number of the VLAN that this static multicast group is to use.
Group IP	This is the static multicast IP address.
Type a VID and a group IP and click **Apply** to display entries in the first table.	
Index	This column lists the slot numbers of the line cards. Click the number of an active line card to go to a screen where you can set the membership of each of the card's ports for this static multicast group.
Cardname	This field displays the type of card installed in a slot.

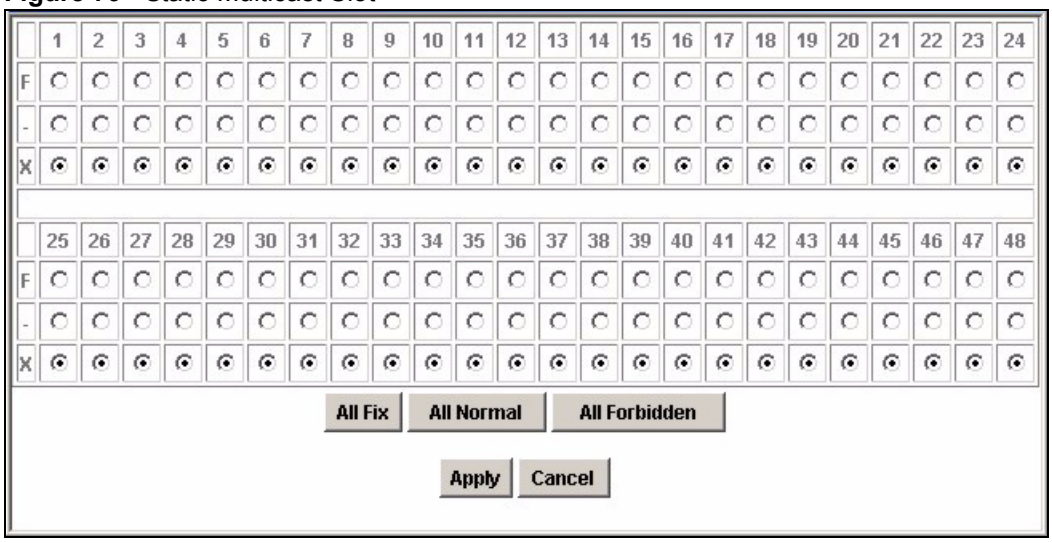
Table 42 Static Multicast (continued)

LABEL	DESCRIPTION
Port	This section lists the VLAN membership setting of each port on each line card. An “F” indicates that the port is a permanent member of the static multicast group. An “X” indicates that the port is forbidden (blocked) from joining the static multicast group. An “-” indicates that the port is a normal member and can join the group dynamically.
Apply	Click **Apply** to save the changes in this screen to the system’s volatile memory. The system loses these changes if it is turned off or loses power, so use the **Config Save** on the navigation panel and then the **Save** button to save your changes to the non-volatile memory when you are done configuring.
New	After you click **Apply**, entries display in the first table so you can edit them. Click **New** if you want to configure a different static multicast group.
Cancel	Click **Cancel** to begin configuring the screen again.
Modify	Select a static multicast group’s radio button and click **Modify** to display the static multicast group in the table above so you can edit it.
Delete	Select a static multicast group’s radio button and click **Delete** to remove the static multicast group.
VID	This is the number of the VLAN that this static multicast group uses.
Group IP	This is the static multicast IP address.
Port	This section lists the VLAN membership setting of the ports on the management switch card. An “F” indicates that the port is a permanent member of the static multicast group. An “X” indicates that the port is forbidden (blocked) from joining the static multicast group. An “-” indicates that the port is a normal member and can join the VLAN dynamically.
Slot	This section displays the numbers of any slots that are fixed members of the static multicast group. All other slots are represented by a “-”.
Select	Select a static multicast group’s radio button and then click **Modify** to be able to edit it or click **Delete** to remove it.

10.6.1 Static Multicast Slot Screen

Click **Multicast > Static Multicast** in the navigation panel to display the **Static Multicast** screen. Type a VID and a group IP and click **Apply** to display entries in the first table. Click the slot number of an active line card to open the following screen.

Figure 79 Static Multicast Slot



The following table describes the related labels in this screen.

Table 43 Static Multicast Slot

LABEL	DESCRIPTION
1~X	The numbers represent the individual ports on the card. Use the **F**, **-**, and **X** radio buttons to set each port's membership in the static multicast group. Select **F** to make the port a permanent member of the static multicast group. Select **-** to make the port a normal member and allow it to join the VLAN dynamically. Select **X** to set the port to "forbidden" meaning it is always blocked from joining the static multicast group. Use the **All Fix**, **All Normal** or **All Forbidden** button if you want to set all of the card's ports to the same membership status for this static multicast group.
Apply	Click **Apply** to save the changes in this screen to the system's volatile memory. The system loses these changes if it is turned off or loses power, so use the **Config Save** on the navigation panel and then the **Save** button to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to close the screen without saving your changes.

11

DSL Port Setup Screens

This chapter explains how to configure settings for individual DSL ports. It also covers how to configure permanent virtual circuits.

11.1 ADSL Standards Overview

These are the ADSL standards and rates that the ADSL line card supports at the time of writing. The actual transfer rates will vary depending on what the subscriber's device supports, the line conditions and the connection distance.

Table 44 ADSL Standards Maximum Transfer Rates

STANDARD	MAXIMUM DOWNSTREAM	MAXIMUM UPSTREAM
G.dmt	8160 Kbps	1024 Kbps
ANSI T1.413 issue 2	8160 Kbps	1024 Kbps
G.lite	1536 Kbps	512 Kbps
ADSL2	12000 Kbps	1200 Kbps
ADSL2 Annex M	12000 Kbps	2400 Kbps
ADSL2+	25000 Kbps	1200 Kbps
ADSL2+ Annex M	25000 Kbps	2400 Kbps

11.2 VDSL Parameters

The following sections introduce some VDSL parameters.

11.2.1 Frequency Band Plan

Each VDSL mode operates in a different frequency band allocation, resulting in different upstream and downstream speeds.

Band plan 997 is optimized for symmetric connections and is used mostly in Europe.[2] Band plan 998 is suitable for asymmetric connections and is widely used in North America.

2. Band plan 997 is not supported at the time of writing.

11.2.2 Upstream Power Back Off

PSD (Power Spectral Density) defines the distribution of a VDSL line's power in the frequency domain.

In a network with varying telephone wiring lengths, the PSD on each line is different. This causes crosstalk between the lines. Enable Upstream Power Back Off (UPBO) to allow the system to adjust the transmit PSD of all lines based on a reference line length so that the PSD at the receiving end is the same.

11.2.3 RFI (Radio Frequency Interference)

RFI is induced noise on the lines by surrounding radio frequency electromagnetic radiation from sources such as AM and HAM radio stations. Since VDSL uses a much larger frequency range that overlaps with other radio frequency systems, signals from VDSL lines and other radio systems interfere with each other. To avoid performance degradation due to RFI, set the switch to not transmit VDSL signals in the RFI band defined by the regulatory bodies (ETSI and ANSI). You can also configure your own RFI bands on the system.

11.3 Downstream and Upstream

Downstream refers to traffic going out from the line card to the subscriber's DSL modem or router. Upstream refers to traffic coming into the line card from the subscriber's DSL modem or router.

11.4 DSL Profiles

A DSL profile is a table that contains a list of pre-configured DSL settings. Each DSL port has one (and only one) profile assigned to it at any given time. You can configure multiple profiles, including profiles for troubleshooting. Profiles allow you to configure DSL ports efficiently. You can configure many DSL ports with the same profile, thus removing the need to configure the settings of each DSL port one-by-one. You can also change an individual DSL port's settings by assigning it a different profile.

For example, you could set up different profiles for different kinds of accounts (for example, economy, standard and premium). Assign the appropriate profile to an DSL port and it takes care of a large part of the port's configuration. You still get to individually enable or disable each port and configure port specific settings. See the chapter on profiles for how to configure DSL profiles.

11.5 Alarm Profiles

Alarm profiles define DSL port alarm thresholds. The system sends an alarm trap and generates a syslog entry when the thresholds of the alarm profile are exceeded. See the chapter on profiles for how to configure alarm profiles.

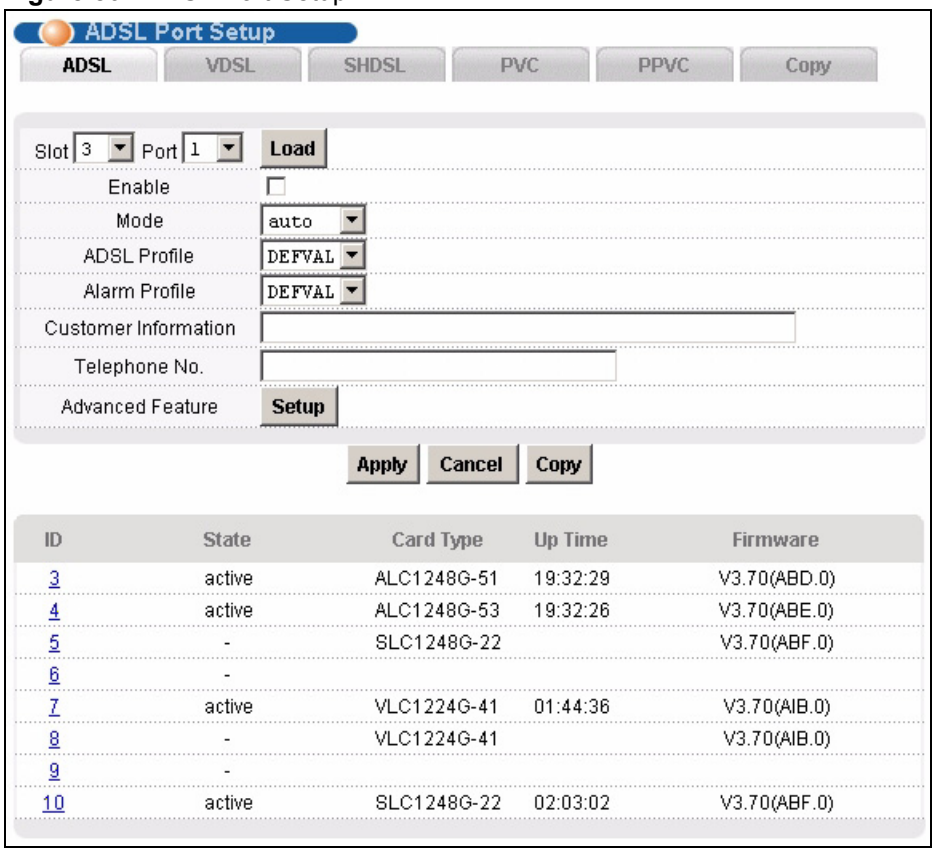
11.6 Default Settings

The default profiles always exists and all of the DSL ports use the default profile settings when the line card is shipped. The default profiles are named DEFVAL. Refer to the chapter on initial configuration for the settings of the default profile and DSL port default settings.

11.7 ADSL Port Setup

Click **Port > ADSL** in the navigation panel to open the following screen. Use this screen to configure settings for individual ADSL ports.

Figure 80 ADSL Port Setup



The following table describes the fields in this screen.

Table 45 ADSL Port Setup

LABEL	DESCRIPTION
Slot	Select the number of a line card's slot.
Port	Select the number of a DSL port on the line card.
Load	Click **Load** to display the port's settings in the fields below.
Enable	Select this check box to turn on this port.
Mode	Select the port's ADSL operational mode. Select the mode that the subscriber's device uses or auto to have the system automatically determine the mode to use. See Table 44 on page 151 for information on the individual ADSL modes.

Table 45 ADSL Port Setup (continued)

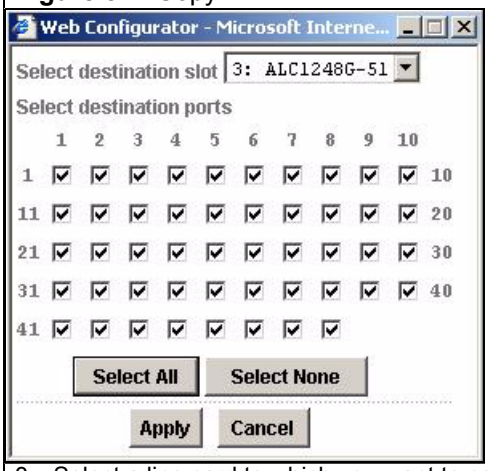
LABEL	DESCRIPTION
ADSL Profile	Select a profile of ADSL settings (such as the transfer rate, interleave delay and signal to noise ratio settings) to assign to this port. Use the **ADSL Profile** screen to configure ADSL port profiles.
Alarm Profile	Select an alarm profile to define the thresholds that trigger an alarm on the port when exceeded.
Customer Information	Enter information to identify the subscriber connected to this ADSL port. You can use up to 31 printable English keyboard characters (including spaces and hyphens).
Telephone No.	Enter information to identify the telephone number of the subscriber connected to this ADSL port. You can use up to 15 English keyboard characters (including spaces and hyphens).
Advanced Feature	Click the **Setup** button to open a screen where you can configure the ADSL port's detailed settings.
Apply	Click **Apply** to save the changes in this screen to the system's volatile memory. The system loses these changes if it is turned off or loses power, so use the **Config Save** on the navigation panel and then the **Save** button to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to begin configuring the screen again.
Copy	Do the following to copy DSL settings from one DSL port to another DSL port or ports. 1. Use the **Slot** and **Port** drop-down list boxes and the **Load** button to select the number of the DSL port from which you want to copy settings. 2. Click **Copy** to open the following screen. **Figure 81** Copy  3. Select a line card to which you want to copy settings. 4. Select the check boxes of the DSL ports on the line card to which you want to copy the settings. Click **Select All** to mark all of the port check boxes or click **Select None** to clear all of the port check boxes. 5. Click **Apply** to copy the settings to all of the ports that you have selected in this screen. Click **Cancel** to close the screen without saving changes.
ID	This column lists the slot numbers of the line cards. Click the ID number of an active ADSL line card to go to a screen where you can copy an ADSL port's settings to another ADSL port.

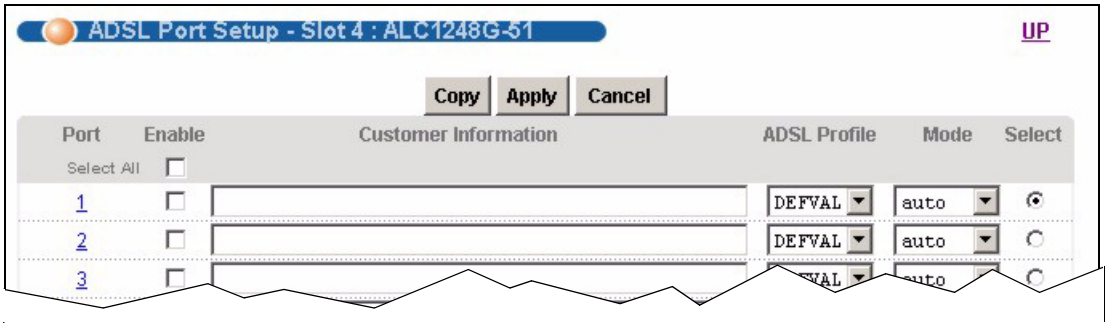
Table 45 ADSL Port Setup (continued)

LABEL	DESCRIPTION
State	This field displays the line card's current operational status. **active** means the line card is operating normally. **init** means the MSC1000G is initializing the line card. **disable** means a manager has disabled the line card. **inactive** means the line card is starting up or is not operating normally. This could be due to the card starting, a firmware upgrade in progress or a malfunction. See Section 34.6 on page 598 for what to do if the line card stays stuck in the inactive state.
Card Type	This field displays the type of a line card.
Up Time	This field displays how long the line card has been running since the last time it was started.
Firmware	This field displays the current firmware version installed on the line card.

11.7.1 ADSL Port Setup Line Card Screen

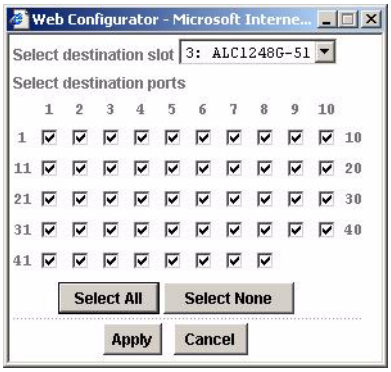
Click **Port > ADSL** in the navigation panel to open the **ADSL Port Setup** screen. Click the slot number of an active ADSL line card to open the following screen. Use this screen to configure settings for individual ADSL ports and copy settings between ports.

Figure 82 ADSL Port Setup: Line Card



The following table describes the fields in this screen.

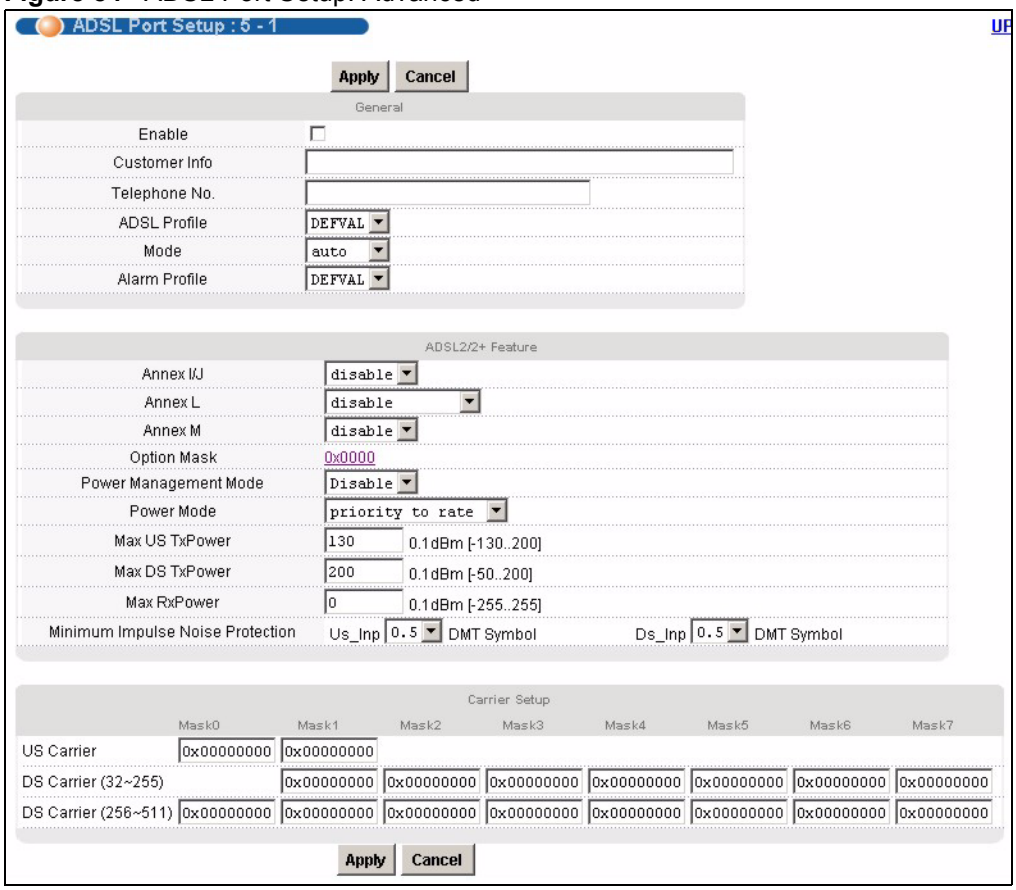
Table 46 ADSL Port Setup: Line Card

LABEL	DESCRIPTION
UP	Click this to return to the previous screen.
Copy	Do the following to copy settings from one DSL port to another DSL port or ports. 1. Use the **Select** column to choose a DSL port from which you want to copy settings. 2. Click **Copy** to open the following screen. **Figure 83** Copy  3. Select a line card to which you want to copy settings. 4. Select the check boxes of the DSL ports on the line card to which you want to copy the settings. Click **Select All** to mark all of the port check boxes or click **Select None** to clear all of the port check boxes. 5. Click **Apply** to copy the settings to all of the ports that you have selected in this screen. Click **Cancel** to close the screen without saving changes.
Apply	Click **Apply** to save the changes in this screen to the system's volatile memory. The system loses these changes if it is turned off or loses power, so use the **Config Save** on the navigation panel and then the **Save** button to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to begin configuring the screen again.
Port	These are the numbers of the DSL ports on the line card. To configure advanced port settings, click a port number to display the **ADSL Port Setup** screen.
Enable	Select a check box in this column to turn on a port. Select the check box at the top of the column to turn on all of the line card's ports.
Customer Information	Enter information to identify the subscriber connected to this ADSL port. You can use up to 31 printable English keyboard characters (including spaces and hyphens).
ADSL Profile	Select a profile of ADSL settings (such as the transfer rate, interleave delay and signal to noise ratio settings) to assign to this port. Use the **ADSL Profile** screen to configure ADSL port profiles.
Mode	Select the port's ADSL operational mode. Select the mode that the subscriber's device uses or auto to have the system automatically determine the mode to use. See Table 44 on page 151 for information on the individual ADSL modes.
Select	Use the **Select** column to choose a DSL port from which you want to copy settings.

11.7.2 ADSL Port Setup Advanced

Click **Port > ADSL** in the navigation panel to open the **ADSL Port Setup** screen. Click the slot number of an active ADSL line card and click a port number to display the configuration screen. Use this screen to configure an ADSL port's detailed settings.

Figure 84 ADSL Port Setup: Advanced



The following table describes the fields in this screen.

Table 47 ADSL Port Setup: Advanced

LABEL	DESCRIPTION
UP	Click this to return to the previous screen.
Apply	Click **Apply** to save the changes in this screen to the system's volatile memory. The system loses these changes if it is turned off or loses power, so use the **Config Save** on the navigation panel and then the **Save** button to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to begin configuring the screen again.
Enable	Select this check box to turn on this port.
Customer Info	Enter information to identify the subscriber connected to this ADSL port. You can use up to 31 printable English keyboard characters (including spaces and hyphens).
Telephone No.	Enter information to identify the telephone number of the subscriber connected to this ADSL port. You can use up to 15 English keyboard characters (including spaces and hyphens).

Table 47 ADSL Port Setup: Advanced (continued)

LABEL	DESCRIPTION
ADSL Profile	Select a profile of ADSL settings (such as the transfer rate, interleave delay and signal to noise ratio settings) to assign to this port. Use the **ADSL Profile** screen to configure ADSL port profiles.
Mode	Select an ADSL mode from the drop-down list box the card is to use.
Alarm Profile	Select an alarm profile to define the thresholds that trigger an alarm on the port when exceeded.
ADSL2/2+ Feature	These are features available with ADSL2/2+. The subscriber's ADSL device must also support the individual features in order to use them.
Annex I/J	Enable Annex I /J to use all digital mode. With Annex I/J, the ADSL connection uses the full spectrum of the physical line and the user can not use POTS or ISDN service. This increases the upstream data rate. Note: The subscriber cannot use POTS or ISDN services when you enable Annex I/J.
Annex L	Enable Annex L to use reach extended ADSL2. This allows increased connection distances. Select **enable (narrow)** to enable extended ADSL2 in narrow Power Spectral Density (PSD) mode. Narrow mode supports longer loop lengths but has lower transmission speeds. Select **enable (wide)** to enable extended ADSL2 in wide PSD mode. Narrow mode supports higher transmission speeds but requires shorter loop lengths. Select **disable** to disable extended ADSL2.
Annex M	Enable Annex M to use double upstream mode. This has the upstream connection use tones 6 to 63.
Option Mask	This field displays the bit mask that represents the features that have been disabled for this connection. Click the bit mask number to open the **Option Mask** screen where you can disable attributes for the port. This is for advanced troubleshooting.
Power Management Mode	Enable power management to reduce the amount of power used overall and reduce the instances of the connection going down. This increases or decreases the transmission power based on line conditions. It also decreases the number of service interruptions. Select **L2** to have the ADSL connection use power saving mode and reduce the rate when there is no traffic. The rate comes back up when there is traffic. Select **L3** to use both power management modes L2 and L3. **L3** puts the ADSL connection to sleep mode when there is no traffic.
Power Mode	The power mode controls the connection's power adaptivity. Select **fix** to set the maximum downstream transmit power to the number you specify in the **Max DS TxPower** field. Select **priority to power** to give the saving of transmission power priority over the transmission rate. The line card attempts to reduce its transmit power as much as possible while still maintaining the configured minimum rate. This only applies to the downstream connection and the ADSL operational mode must be G.dmt, ANSI T1.413 or G.lite. Select **priority to rate** to give the transmission rate priority over the saving of transmission power. The line card attempts to achieve the maximum configured transmission rate before reducing the transmit power.
Max US TxPower	Set the maximum upstream transmit power, -130~200 in 0.1 dBm.
Max DS TxPower	Set the maximum downstream transmit power, -50~200 in 0.1 dBm.
Max RxPower	Set the maximum aggregate receive power at the line card's port, -255~255 in 0.1 dBm. This only applies to the ADSL2/2+ ADSL operational modes.

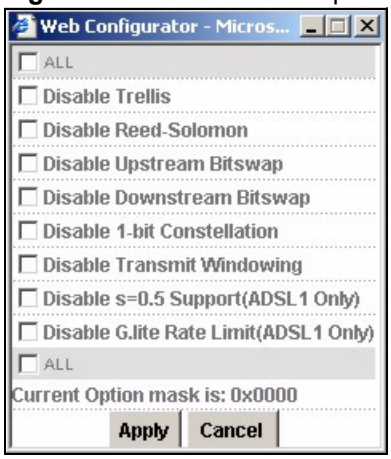
Table 47 ADSL Port Setup: Advanced (continued)

LABEL	DESCRIPTION
Minimum Impulse Noise Protection	Sudden spikes in the line's noise level (impulse noise) can cause errors and result in lost packets. Set the impulse noise protection minimum to have a buffer to protect the ADSL physical layer connection against impulse noise. This buffering causes a delay that reduces transfer speeds. It is recommended that you use a non-zero setting for real time traffic that has no error correction (like video-conferencing). Select a number of DMT symbols to use for the minimum upstream impulse noise protection (Us_Inp) setting. Select a number of DMT symbols to use for the minimum downstream impulse noise protection (Ds_Inp) setting.
Carrier Setup	Use this part of the screen to mask carrier tones. Masking a carrier tone disables the use of that tone on the ADSL port. Do this to have the system not use an ADSL line's tones that are known to have a high noise level. The "0x" at the beginning of the mask fields indicates hexadecimal digits (0~ffffffff) are to be used. Each mask can use up to 8 hexadecimal digits. Each hexadecimal digit represents 4 tones. The hexadecimal digit is converted to binary and a '1' masks (disables) the corresponding tone.
US Carrier	Use these fields to disable upstream carrier tones (from 0~63). Mask0 = tones 0~31 Mask1 = tones 32~63 For example,"0x00000080" in the **Mask0** field and "0x00000000" in the **Mask1** field disables upstream carrier tone 8.
DS Carrier (32~255)	Use these fields to disable downstream carrier tones (from 32~255). Mask1 = tones 32~63 Mask2 = tones 64~95 Mask3 = tones 96~127 Mask4 = tones 128~159 Mask5 = tones 160~191 Mask6 = tones 192~223 Mask7 = tones 224~255 For example, "0x01000000" in the **Mask2** field and all of the other mask fields set to the default disables downstream carrier tone 89. "0x03000000" in the **Mask2** field and all of the other mask fields set to the default disables downstream carrier tones 89 and 90.
DS Carrier (256~511)	Use these fields to disable downstream carrier tones (from 256~511). Mask0 = tones 256~287 Mask1 = tones 288~319 Mask2 = tones 320~351 Mask3 = tones 352~383 Mask4 = tones 384~415 Mask5 = tones 416~447 Mask6 = tones 448~479 Mask7 = tones 480~511 For example, "0x00001000" in the **Mask1** field and all of the other mask fields set to the default disables downstream carrier tone 301. For another example, "0x0000f000"in the **Mask1** field and all of the other mask fields set to the default disables downstream carrier tones 301 to 304.
Apply	Click **Apply** to save the changes in this screen to the system's volatile memory. The system loses these changes if it is turned off or loses power, so use the **Config Save** on the navigation panel and then the **Save** button to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to begin configuring the fields again.

11.7.3 Option Mask Screen

Click **the Option Mask link in the advanced ADSL Port Setup** screen to display a pop-up screen as shown. Use this screen to disable features on a port for advanced troubleshooting.

Figure 85 ADSL Port Setup: Advanced: Option Mask



The following table describes the fields in this screen.

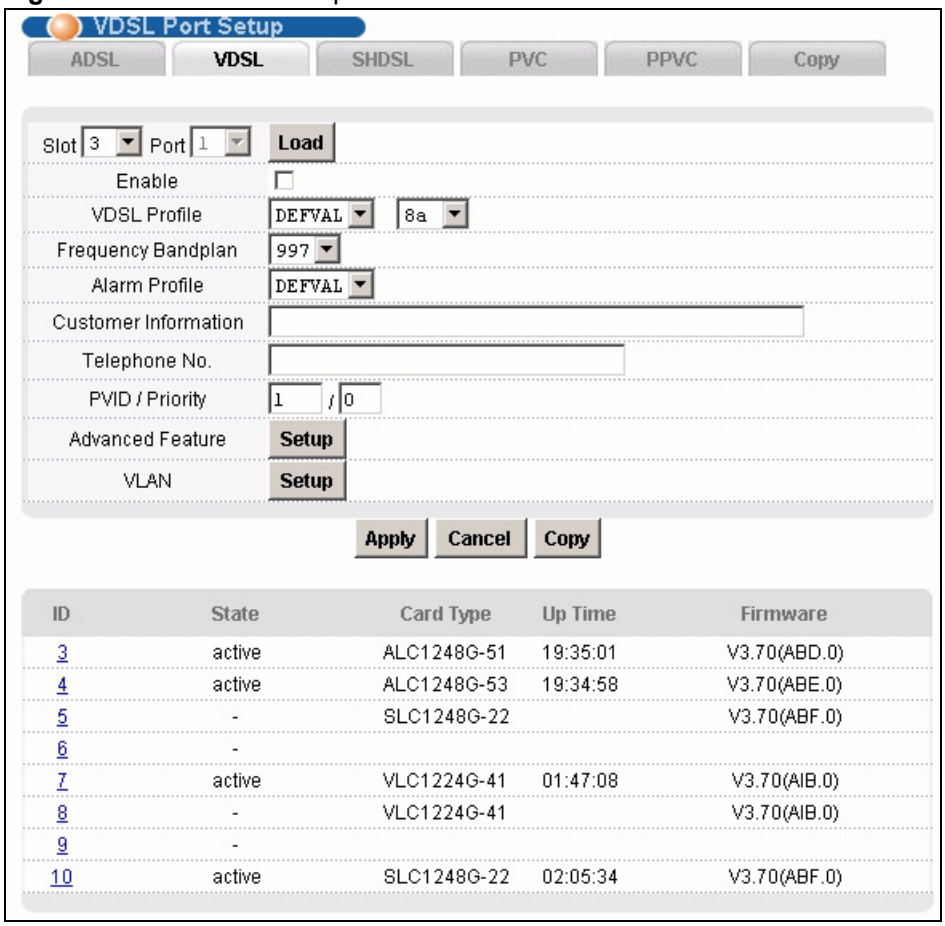
Table 48 ADSL Port Setup: Advanced: Option Mask

LABEL	DESCRIPTION
All	Use the check boxes to disable individual features. Use the **All** check box to select every feature check box.
Disable Trellis	Trellis encoding helps to reduce the noise in ADSL transmissions. Trellis may reduce throughput but it makes the connection more stable.
Disable Reed Solomon	Reed-Solomon performs transmission error correction.
Disable Upstream/ Downstream Bitswap	Bit swapping allows the system to respond to noise on a tone by sending it's data on another tone. The subscriber (ATU-R) equipment must also support this in order for it to work.
Disable 1-bit Constellation	1-bit constellation allows the system to send individual bits over DMT tones that can only support one bit. This allows the connection to use as many of the tones as possible.
Disable Transmit Windowing	Transmit windowing is only available with ADSL2+.
Disable S=0.5 Support(ADSL1 Only)	0.5 support maps two Reed-Solomon code words into one data frame (instead of one) to increase the maximum G.dmt transmission rate.
Disable G.lite Rate Limit (ADSL1 Only)	Disabling the G.lite rate limit allows the G.lite upstream transmission rate to be greater than 512 Kbps.
Current Option mask is:	Selecting or clearing feature check boxes adjusts the current option mask displayed at the bottom of the screen.
Apply	Click **Apply** to save the changes in this screen to the system's volatile memory. The system loses these changes if it is turned off or loses power, so use the **Config Save** on the navigation panel and then the **Save** button to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to close the screen without saving your changes.

11.8 VDSL Port Setup

Click **Port > VDSL** in the navigation panel to open the following screen. Use this screen to configure settings for individual VDSL ports.

Figure 86 VDSL Port Setup



The following table describes the fields in this screen.

Table 49 VDSL Port Setup

LABEL	DESCRIPTION
Slot	Select the number of a line card's slot.
Port	Select the number of a DSL port on the line card.
Load	Click **Load** to display the port's settings in the fields below.
Enable	Select this check box to turn on this port.
VDSL Profile	Select a VDSL line profile to assign to this port. Use the **VDSL Profile** screen to configure VDSL port profiles. Select a profile defined by the VDSL standard from the drop-down list box. Refer to Table 52 on page 166 for profile information.
Frequency Bandplan	Specify a band plan in this field. Select **997** for symmetric connections.[A] Select **998** for asymmetric connections.
Alarm Profile	Select an alarm profile to define the thresholds that trigger an alarm on the port when exceeded.

Table 49 VDSL Port Setup (continued)

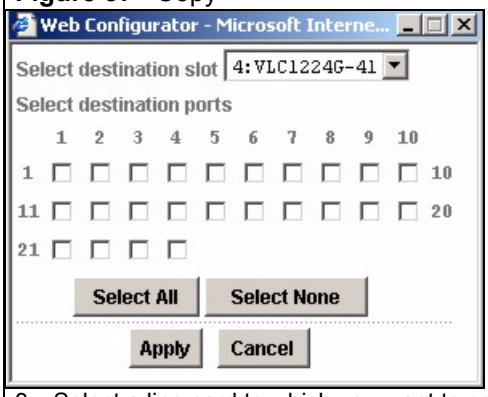
LABEL	DESCRIPTION
Customer Information	Enter information to identify the subscriber connected to this DSL port. You can use up to 31 printable English keyboard characters (including spaces and hyphens).
Telephone No.	Enter information to identify the telephone number of the subscriber connected to this DSL port. You can use up to 15 English keyboard characters (including spaces and hyphens).
Advanced Features	Click the **Setup** button to open a screen where you can configure the VDSL port's detailed settings.
VLAN	Click the **Setup** button to open a screen where you can configure the VLAN settings for the VDSL port.
Apply	Click **Apply** to save the changes in this screen to the system's volatile memory. The system loses these changes if it is turned off or loses power, so use the **Config Save** on the navigation panel and then the **Save** button to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to begin configuring the screen again.
Copy	Do the following to copy DSL settings from one DSL port to another DSL port or ports. 1. Use the **Slot** and **Port** drop-down list boxes and the **Load** button to select the number of the DSL port from which you want to copy settings. 2. Click **Copy** to open the following screen. **Figure 87** Copy  3. Select a line card to which you want to copy settings. 4. Select the check boxes of the DSL ports on the line card to which you want to copy the settings. Click **Select All** to mark all of the port check boxes or click **Select None** to clear all of the port check boxes. 5. Click **Apply** to copy the settings to all of the ports that you have selected in this screen. Click **Cancel** to close the screen without saving changes.
ID	This column lists the slot numbers of the line cards. Click the ID number of an active DSL line card to go to a screen where you can copy an DSL port's settings to another DSL port.
State	This field displays the line card's current operational status. **active** means the line card is operating normally. **init** means the MSC1000G is initializing the line card. **disable** means a manager has disabled the line card. **inactive** means the line card is starting up or is not operating normally. This could be due to the card starting, a firmware upgrade in progress or a malfunction. See Section 34.6 on page 598 for what to do if the line card stays stuck in the inactive state.

Table 49 VDSL Port Setup (continued)

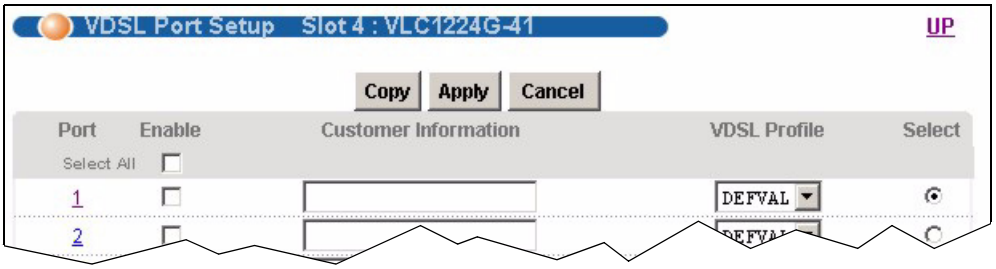
LABEL	DESCRIPTION
Card Type	This field displays the type of a line card.
Up Time	This field displays how long the line card has been running since the last time it was started.
Firmware	This field displays the current firmware version installed on the line card.

A. Band plan 997 is not supported at the time of writing.

11.8.1 VDSL Port Setup Line Card Screen

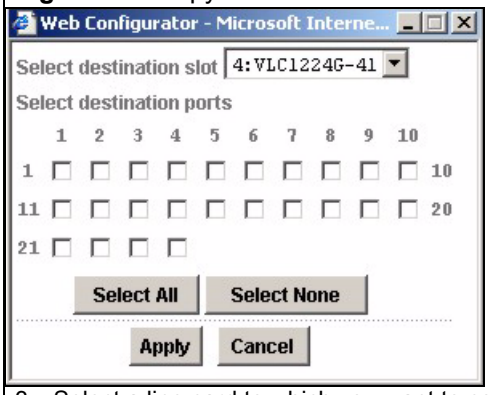
Click **Port > VDSL** in the navigation panel to open the **VDSL Port Setup** screen. Click the slot number of an active VDSL line card to open the following screen. Use this screen to configure settings for individual VDSL ports and copy settings between ports.

Figure 88 VDSL Port Setup: Line Card



The following table describes the fields in this screen.

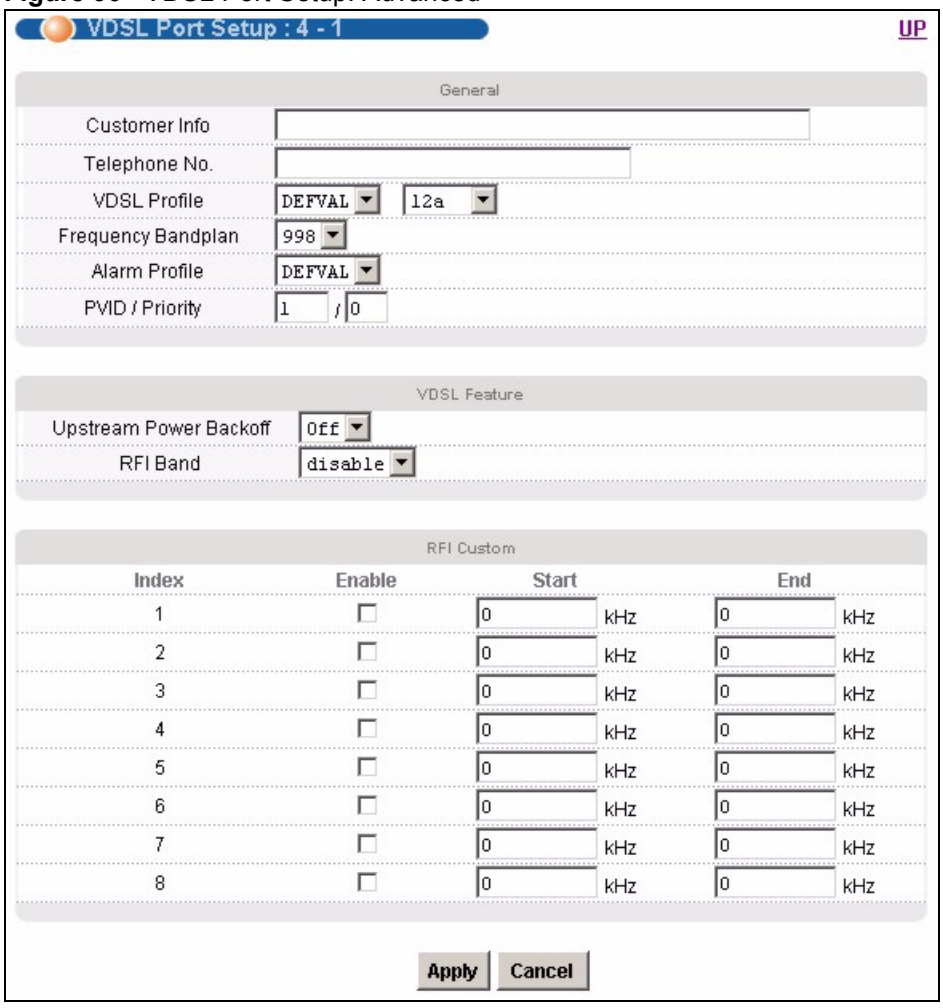
Table 50 VDSL Port Setup: Line Card

LABEL	DESCRIPTION
UP	Click this to return to the previous screen.
Copy	Do the following to copy settings from one DSL port to another DSL port or ports. 1. Use the **Select** column to choose a DSL port from which you want to copy settings. 2. Click **Copy** to display the following screen. **Figure 89** Copy  3. Select a line card to which you want to copy settings. 4. Select the check boxes of the DSL ports on the line card to which you want to copy the settings. Click **Select All** to mark all of the port check boxes or click **Select None** to clear all of the port check boxes. 5. Click **Apply** to copy the settings to all of the ports that you have selected in this screen. Click **Cancel** to close the screen without saving changes.
Apply	Click **Apply** to save the changes in this screen to the system's volatile memory. The system loses these changes if it is turned off or loses power, so use the **Config Save** on the navigation panel and then the **Save** button to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to begin configuring the screen again.
Port	These are the numbers of the DSL ports on the line card. To configure advanced port settings, click a port number to display the **VDSL Port Setup** screen.
Enable	Select a check box in this column to turn on a port. Select the check box at the top of the column to turn on all of the line card's ports.
Customer Information	Enter information to identify the subscriber connected to this VDSL port. You can use up to 31 printable English keyboard characters (including spaces and hyphens).
VDSL Profile	Select a profile of VDSL settings (such as the transfer rate, interleave delay and signal to noise ratio settings) to assign to this port. Use the **VDSL Profile** screen to configure VDSL port profiles.
Select	Use the **Select** column to choose a DSL port from which you want to copy settings.

11.8.2 VDSL Port Setup Advanced

Click **Port > VDSL** in the navigation panel to open the **VDSL Port Setup** screen. Click the slot number of an active VDSL line card and click a port number to display the configuration screen. Use this screen to configure an VDSL port's detailed settings.

Figure 90 VDSL Port Setup: Advanced



The following table describes the fields in this screen.

Table 51 VDSL Port Setup: Advanced

LABEL	DESCRIPTION
UP	Click this to return to the previous screen.
Customer Info	Enter information to identify the subscriber connected to this VDSL port. You can use up to 31 printable English keyboard characters (including spaces and hyphens).
Telephone No.	Enter information to identify the telephone number of the subscriber connected to this VDSL port. You can use up to 15 English keyboard characters (including spaces and hyphens).
VDSL Profile	Select a VDSL line profile to assign to this port. Use the **VDSL Profile** screen to configure VDSL port profiles. Select a profile defined by the VDSL standard from the drop-down list box. Refer to Table 52 on page 166 for profile information.
Frequency Bandplan	Specify a band plan in this field. Select **997** for symmetric connections.[A] Select **998** for asymmetric connections.
Alarm Profile	Select an alarm profile to define the thresholds that trigger an alarm on the port when exceeded.

Table 51 VDSL Port Setup: Advanced (continued)

LABEL	DESCRIPTION
PVID/Priority	Enter the port VID and the VLAN priority.
VDSL Feature	
Upstream Power Backoff	UPBO (Upstream Power Back Off) allows the switch to provide better service in a network environment with telephone wiring of varying lengths. Select **On** to activate this feature. Select **Off** to deactivate this feature.
RFI Band	RFI is induced noise on the lines by surrounding radio sources such as AM and HAM radio stations. To avoid performance degradation due to RFI, set the switch to not transmit VDSL signals in the RFI band plans defined by the regulatory bodies. You can also configure your own RFI band plans on the system. Select **ansi** to use the RFI band plan settings defined by ANSI. Select **etsi** to use the RFI band plan settings defined by ETSI. Select **Disable** to deactivate this function. Select **Custom** to configure RFI settings in the fields below.
RFI Custom	Settings in these fields apply to all VDSL ports. This means if you change the custom RFI settings on one VDSL port, the same changes apply to all other VDSL ports.
Index	This field displays the index number.
Enable	Select **Enable** to activate the RFI band.
Start	Enter the start of the frequency range in kilo Herz (kHz).
End	Enter the end of the frequency range in kHz.
Apply	Click **Apply** to save the changes in this screen to the system's volatile memory. The system loses these changes if it is turned off or loses power, so use the **Config Save** on the navigation panel and then the **Save** button to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to begin configuring the fields again.

A. Band plan 997 is not supported at the time of writing.

The following table lists the supported VDSL profiles defined by the VDSL standard.

Table 52 Supported VDSL Profiles

PROFILE	8A	8B	8C	8D	12A
Bandwidth (MHz)	8.832	8.832	8.5	8.832	12
Tone	2048	2048	1972	2048	2783
Tone Spacing (kHz)	4.3125	4.3125	4.3125	4.3125	4.3125
Line Power (dBm)	+17.5	+20.5	+11.4	+14.5	+14.5

11.8.3 Transparent LAN Service (TLS)

Transparent LAN Service (also known as VLAN stacking or Q-in-Q) allows a service provider to distinguish multiple customers VLANs, even those with the same (customer-assigned) VLAN ID, within its network.

Use TLS to add an outer VLAN tag to the inner IEEE 802.1Q tagged frames that enter the network. By tagging the tagged frames ("double-tagged" frames), the service provider can manage up to 4,094 VLAN groups with each group containing up to 4,094 customer VLANs. This allows a service provider to provide different services, based on specific VLANs, for many different customers.

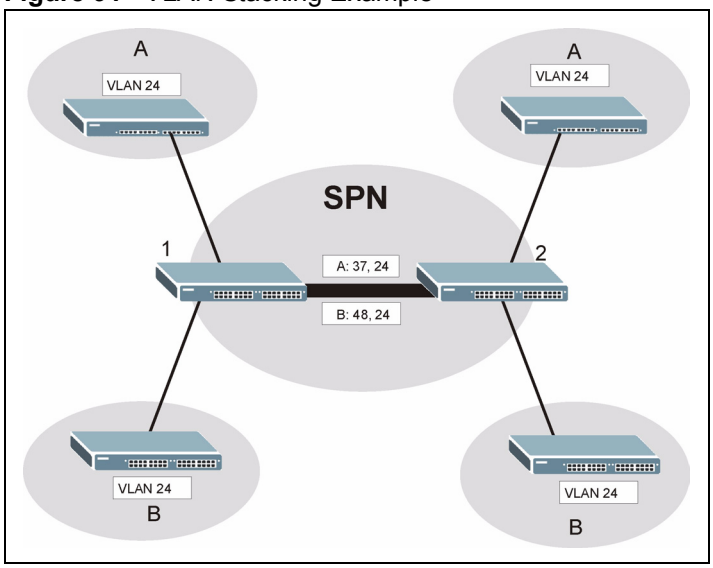
A service provider's customers may require a range of VLANs to handle multiple applications. A service provider's customers can assign their own inner VLAN tags to traffic. The service provider can assign an outer VLAN tag for each customer. Therefore, there is no VLAN tag overlap among customers, so traffic from different customers is kept separate.

Before the switch sends the frames from the customers, the VLAN ID is added to the frames. When packets intended for specific customers are received on the MSC1000G, the outer VLAN tag is removed before the traffic is sent.

11.8.4 TLS Network Example

In the following example figure, both A and B are Service Provider's Network (SPN) customers with VPN tunnels between their head offices and branch offices respectively. Both have an identical VLAN tag for their VLAN group. The service provider can separate these two VLANs within its network by adding tag 37 to distinguish customer A and tag 48 to distinguish customer B at edge device 1 and then stripping those tags at edge device 2 as the data frames leave the network.

Figure 91 VLAN Stacking Example



11.8.4.1 VLAN Tag Format

A VLAN tag (service provider VLAN stacking or customer IEEE 802.1Q) consists of the following three fields.

Table 53 VLAN Tag Format

Type	Priority	VID

Type is a standard Ethernet type code identifying the frame and indicates that whether the frame carries IEEE 802.1Q tag information. **SP TPID** (Service Provider Tag Protocol Identifier) is the service provider VLAN stacking tag type. The system use 0x8100.

TPID (Tag Protocol Identifier) is the customer IEEE 802.1Q tag.

Priority refers to the IEEE 802.1p standard that allows the service provider to prioritize traffic based on the class of service (CoS) the customer has paid for.

- On the switch, configure the priority level of the inner IEEE 802.1Q tag in the **Port Setup** screen.
- "0" is the lowest priority level and "7" is the highest.

VID is the VLAN ID. **SP VID** is the VID for the second (service provider's) VLAN tag.

11.8.4.2 Frame Format

The frame format for an untagged Ethernet frame, a single-tagged 802.1Q frame (customer) and a "double-tagged" 802.1Q frame (service provider) is shown next.

Configure the fields as circled in the switch **VLAN Stacking** screen.

Table 54 Single and Double Tagged 802.1Q Frame Format

						DA	SA	Len/ Etype	Data	FCS	**Untagged Ethernet frame**
			DA	SA	**TPID**	**Priority**	**VID**	Len/ Etype	Data	FCS	**IEEE 802.1Q customer tagged frame**
DA	SA	**SPTPID**	**Priority**	**VID**	**TPID**	**Priority**	**VID**	Len/ Etype	Data	FCS	**Double-tagged frame**

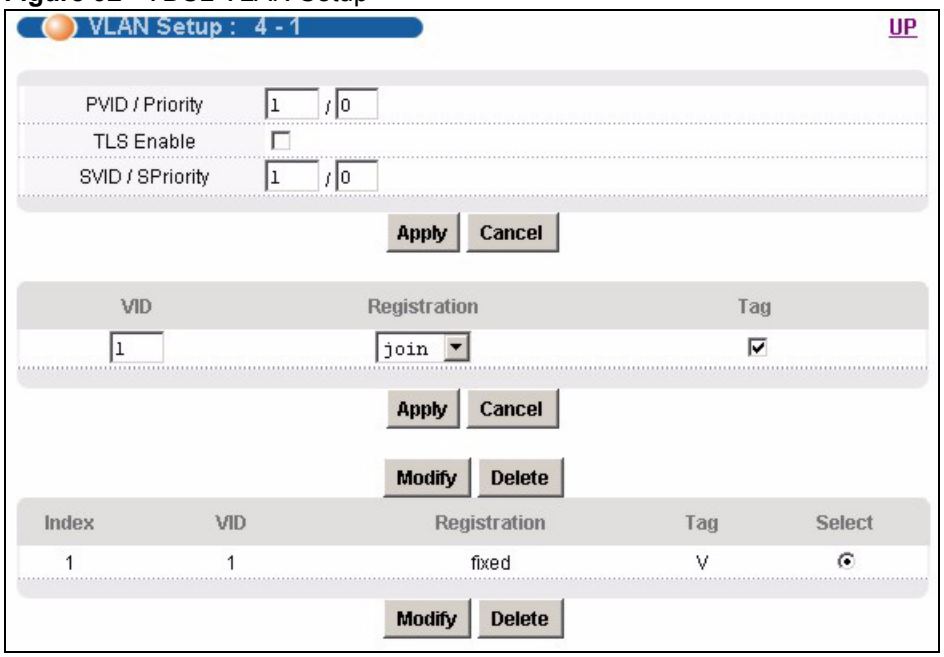
Table 55 802.1Q Frame

DA	Destination Address	Priority	802.1p Priority
SA	Source Address	Len/ Etype	Length and type of Ethernet frame
(SP)TPID	(Service Provider) Tag Protocol IDentifier	Data	Frame data
VID	VLAN ID	FCS	Frame Check Sequence

11.8.5 VDSL VLAN Setup

Click **Port > VDSL** in the navigation panel to open the **VDSL Port Setup** screen. Select a VDSL line card ID, a port index number and click **Setup** next to **VLAN** to open the following screen. Use this screen to add the VDSL port to VLANs (or remove it from VLANs) and configure the TLS (Transparent LAN Service) settings.

Figure 92 VDSL VLAN Setup



The following table describes the fields in this screen.

Table 56 VDSL Port Setup: VLAN Setup

LABEL	DESCRIPTION
UP	Click this to return to the previous screen.
PVID/Priority	PVID refers to the customer's VLAN ID. In the first field, enter the customer VLAN ID (from 1 to 4094) for frames received on this port. In the second field, enter the priority level for the customer VLAN ID. "0" is the lowest priority level and "7" is the highest.
TLS Enable	Transparent LAN Service (also known as VLAN stacking or Q-in-Q) allows a service provider to distinguish multiple customers VLANs, even those with the same (customer-assigned) VLAN ID, within its network. Select this option to enable TLS (Transparent LAN Service). Clear this check box to disable this feature. Refer to Section 27.22 on page 461 for more information.
SPVID/Priority	SPVID refers to the service provider's VLAN ID (the outer VLAN tag). In the first field, enter the service provider ID (from 1 to 4094) for frames received on this port. In the second field, enter the priority level for the service provider's VLAN ID. "0" is the lowest priority level and "7" is the highest.
Apply	Click **Apply** to save the changes in this screen to the system's volatile memory. The system loses these changes if it is turned off or loses power, so use the **Config Save** on the navigation panel and then the **Save** button to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to begin configuring the screen again.
VID	Type a VID (VLAN ID) to add this port as a member. This must be the VLAN ID of a VLAN that is already configured. The port that you are configuring must also be set to the fixed status in the VLAN.
Registration	Select **join** to have the port be a member of the specified VLAN. Select **leave** to remove the port from the specified VLAN.
Tag	Select the check box to tag all frames transmitted on this port with the port's VID.

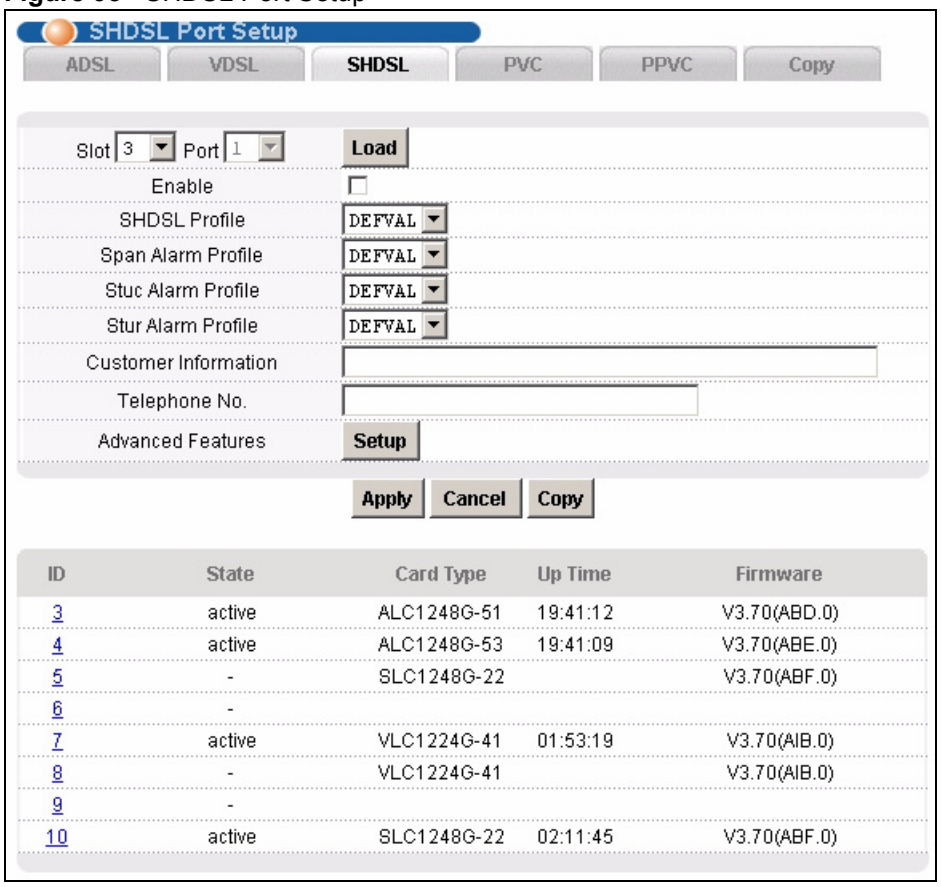
Table 56 VDSL Port Setup: VLAN Setup (continued)

LABEL	DESCRIPTION
Apply	Click **Apply** to save the changes in this screen to the system's volatile memory. The system loses these changes if it is turned off or loses power, so use the **Config Save** on the navigation panel and then the **Save** button to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to begin configuring the screen again.
The table in the bottom half of the screen lists the VLANs that the port is a member of.	
Modify	Click **Modify** to display the selected VLAN membership entry's settings in the fields above so you can edit them.
Delete	Click **Delete** to remove the selected VLAN membership entry.
Index	This is the number of the VLAN membership entry.
VID	This field displays the number of a VLAN (VLAN ID) of which this port is a member.
Registration	This field displays "fixed" to indicate that the port is a member of the specified VLAN.
Tag	This field displays "V" if the line card is to tag all frames that are transmitted out on this port with this VLAN group ID. It displays "-" if the line card does not tag all frames that are transmitted out on this port with this VLAN group ID.
Select	Select the radio button of a VLAN membership entry and then use the **Modify** button or the **Delete** button.

11.9 SHDSL Port Setup

Click **Port > SHDSL** in the navigation panel to open the following screen. Use this screen to configure settings for individual SHDSL ports.

Figure 93 SHDSL Port Setup



The following table describes the fields in this screen.

Table 57 SHDSL Port Setup

LABEL	DESCRIPTION
Slot	Select the number of a line card's slot.
Port	Select the number of a DSL port on the line card.
Load	Click **Load** to display the port's settings in the fields below.
Enable	Select this check box to turn on this port.
SHDSL Profile	Select a profile of SHDSL settings (such as the transfer rate, wire pair and signal to noise ratio settings) to assign to this port. Use the **SHDSL Profile** screen to configure SHDSL port profiles.
Span Alarm Profile	Select an alarm profile to define the thresholds that trigger an alarm on the port when exceeded. This alarm profile is for the whole span. This is the entire connection including any SHDSL regenerators that might be located between the STU-C (SHDSL Termination Unit - Central) and STU-R (SHDSL Termination Unit - Remote) end points. An SHDSL regenerator amplifies the SHDSL signal in order to increase the connection distance.
Stuc Alarm Profile	Select an alarm profile to define the thresholds that trigger an alarm on the port when exceeded. This alarm profile is for the STU-C (SHDSL Termination Unit - Central) end point.
Stur Alarm Profile	Select an alarm profile to define the thresholds that trigger an alarm on the port when exceeded. This alarm profile is for the STU-R (SHDSL Termination Unit - Remote) end point.

Table 57 SHDSL Port Setup (continued)

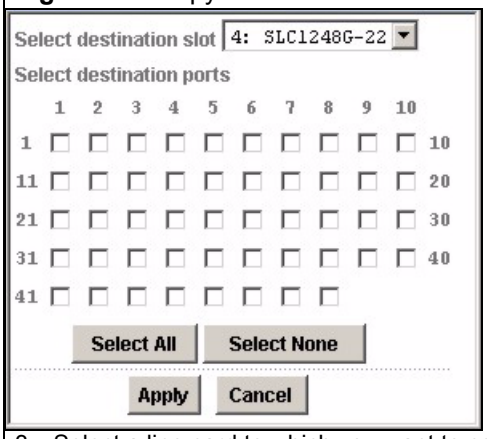
LABEL	DESCRIPTION
Customer Information	Enter information to identify the subscriber connected to this DSL port. You can use up to 31 printable English keyboard characters (including spaces and hyphens).
Telephone No.	Enter information to identify the telephone number of the subscriber connected to this DSL port. You can use up to 15 English keyboard characters (including spaces and hyphens).
Advanced Features	Click the **Setup** button to open a screen where you can configure the SHDSL port's detailed settings.
Apply	Click **Apply** to have the specified DSL port use the selected IGMP filter profile.
Cancel	Click **Cancel** to set the fields back to the settings that you last retrieved.
Copy	Do the following to copy DSL settings from one DSL port to another DSL port or ports. 1. Use the **Slot** and **Port** drop-down list boxes and the **Load** button to select the number of the DSL port from which you want to copy settings. 2. Click **Copy** to open the following screen. **Figure 94** Copy  3. Select a line card to which you want to copy settings. 4. Select the check boxes of the DSL ports on the line card to which you want to copy the settings. Click **Select All** to mark all of the port check boxes or click **Select None** to clear all of the port check boxes. 5. Click **Apply** to copy the settings to all of the ports that you have selected in this screen. Click **Cancel** to close the screen without saving changes.
ID	This column lists the slot numbers of the line cards. Click the ID number of an active SHDSL line card to go to a screen where you can copy an SHDSL port's settings to another SHDSL port.
State	This field displays the line card's current operational status. **active** means the line card is operating normally. **init** means the MSC1000G is initializing the line card. **disable** means a manager has disabled the line card. **inactive** means the line card is starting up or is not operating normally. This could be due to the card starting, a firmware upgrade in progress or a malfunction. See Section 34.6 on page 598 for what to do if the line card stays stuck in the inactive state.
Card Type	This field displays the type of a line card.

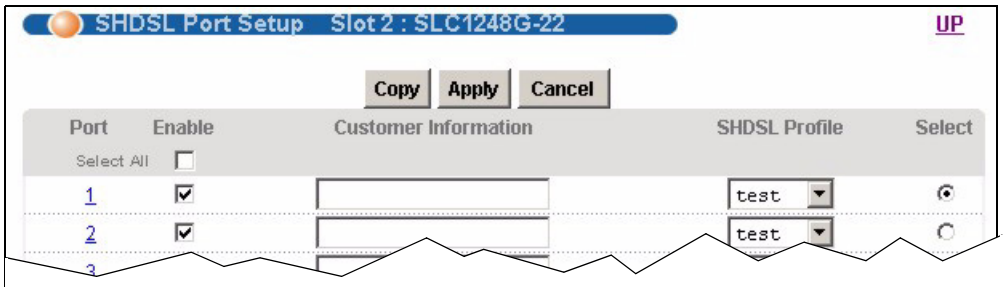
Table 57 SHDSL Port Setup (continued)

LABEL	DESCRIPTION
Up Time	This field displays how long the line card has been running since the last time it was started.
Firmware	This field displays the current firmware version installed on the line card.

11.9.1 SHDSL Port Setup Line Card Screen

Click **Port > SHDSL** in the navigation panel to open the **SHDSL Port Setup** screen. Click the slot number of an active SHDSL line card to open the following screen. Use this screen to configure settings for individual SHDSL ports and copy settings between ports.

Figure 95 SHDSL Port Setup: Line Card



The following table describes the fields in this screen.

Table 58 SHDSL Port Setup: Line Card

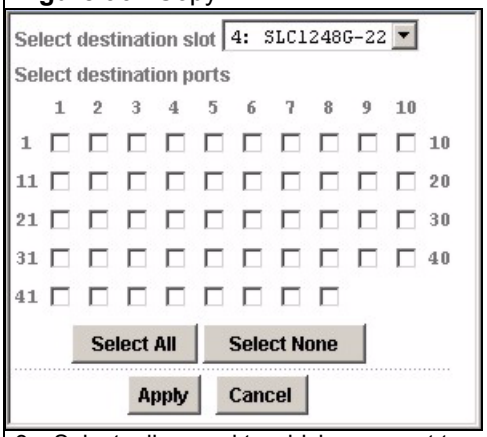
LABEL	DESCRIPTION
UP	Click this to return to the previous screen.
Copy	Do the following to copy settings from one DSL port to another DSL port or ports. 1. Use the **Select** column to choose a DSL port from which you want to copy settings. 2. Click **Copy** to open the following screen. **Figure 96** Copy  3. Select a line card to which you want to copy settings. 4. Select the check boxes of the DSL ports on the line card to which you want to copy the settings. Click **Select All** to mark all of the port check boxes or click **Select None** to clear all of the port check boxes. 5. Click **Apply** to copy the settings to all of the ports that you have selected in this screen. Click **Cancel** to close the screen without saving changes.

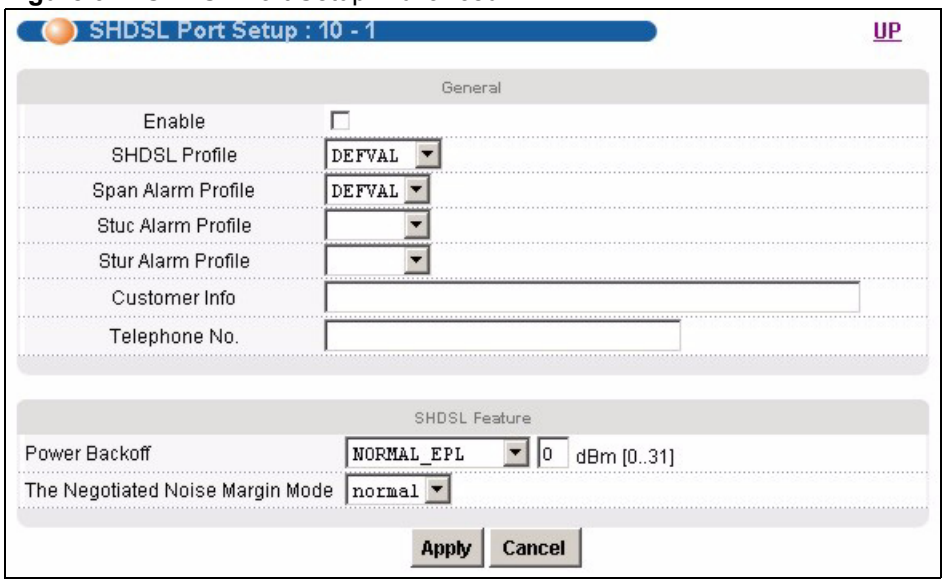
Table 58 SHDSL Port Setup: Line Card (continued)

LABEL	DESCRIPTION
Apply	Click **Apply** to save the changes in this screen to the system's volatile memory. The system loses these changes if it is turned off or loses power, so use the **Config Save** on the navigation panel and then the **Save** button to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to begin configuring the screen again.
Port	These are the numbers of the DSL ports on the line card.
Enable	Select a check box in this column to turn on a port. Select the check box at the top of the column to turn on all of the line card's ports.
Customer Information	Enter information to identify the subscriber connected to this DSL port. You can use up to 31 printable English keyboard characters (including spaces and hyphens).
SHDSL Profile	Select a profile of SHDSL settings (such as the transfer rate, wire pair and signal to noise ratio settings) to assign to this port. Use the **SHDSL Profile** screen to configure SHDSL port profiles. Note: You must apply the same profile on the two SHDSL ports connecting to the same subscriber device.
Select	Use the **Select** column to choose a DSL port from which you want to copy settings.

11.9.2 SHDSL Port Setup Advanced

Click **Port > SHDSL** in the navigation panel to open the **SHDSL Port Setup** screen. Click the **Setup** button to open the following screen. Use this screen to configure an SHDSL port's detailed settings.

Figure 97 SHDSL Port Setup: Advanced



The following table describes the fields in this screen.

Table 59 SHDSL Port Setup: Advanced

LABEL	DESCRIPTION
UP	Click this to return to the previous screen.
Apply	Click **Apply** to save the changes in this screen to the system's volatile memory. The system loses these changes if it is turned off or loses power, so use the **Config Save** on the navigation panel and then the **Save** button to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to begin configuring the screen again.
Enable	Select this check box to turn on this port.
SHDSL Profile	Select a profile of SHDSL settings (such as the transfer rate, wire pair and signal to noise ratio settings) to assign to this port. Use the **SHDSL Profile** screen to configure SHDSL port profiles.
Span Alarm Profile	Select an alarm profile to define the thresholds that trigger an alarm on the port when exceeded. This alarm profile is for the whole span. This is the entire connection including any SHDSL regenerators that might be located between the STU-C (SHDSL Termination Unit - Central) and STU-R (SHDSL Termination Unit - Remote) end points. An SHDSL regenerator amplifies the SHDSL signal in order to increase the connection distance.
Stuc Alarm Profile	Select an alarm profile to define the thresholds that trigger an alarm on the port when exceeded. This alarm profile is for the STU-C (SHDSL Termination Unit - Central) end point.
Stur Alarm Profile	Select an alarm profile to define the thresholds that trigger an alarm on the port when exceeded. This alarm profile is for the STU-R (SHDSL Termination Unit - Remote) end point.
Customer Info	Enter information to identify the subscriber connected to this ADSL port. You can use up to 31 printable English keyboard characters (including spaces and hyphens).
Telephone No.	Enter information to identify the telephone number of the subscriber connected to this ADSL port. You can use up to 15 English keyboard characters (including spaces and hyphens).
SHDSL Feature	
Power Backoff	This command sets the power backoff feature setting on the SHDSL port. Power backoff calculates how much power is needed for the connection. This allows the STU-C and STU-R to use only enough power for the port's maximum transmission rate (configured in the SHDSL profile). You can normally just leave the default setting (**NORMAL_EPL**), you only need to use this command if the STU-R does not support EPL or you need to configure the port to use a specific power backoff setting. Select **NORMAL_EPL** to use power backoff with EPL (Estimated Power Loss). Each end calculates an EPL and uses it in determining a power backoff value for the other end to use. Select **FORCED_EPL** to use forced power backoff with EPL. The STU-C calculates an EPL and uses it in determining the power backoff values for both ends. This can be used when the STU-R device does not support EPL. Select **FORCED_NO_EPL** to use forced power backoff without EPL. The STU-C uses the value you specify in determining the power backoff values for both ends. This can be used when you have prior knowledge about the physical line (loop). Set the power backoff value (0~31 in dBm). When using **NORMAL_EPL** or **FORCED_EPL**, this sets the maximum power backoff value. When using **FORCED_NO_EPL**, this sets the power backoff value.

Table 59 SHDSL Port Setup: Advanced (continued)

LABEL	DESCRIPTION
The Negotiated Noise Margin Mode	Specify how the target noise margin value is acquired. Select **normal** to have each end of the connection determine the target noise margin to be used by the other end. Select **forced** to set the upstream and downstream parameters according to the target noise margin value set in the SHDSL profile.
Apply	Click **Apply** to save the changes in this screen to the system's volatile memory. The system loses these changes if it is turned off or loses power, so use the **Config Save** on the navigation panel and then the **Save** button to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to begin configuring the fields again.

11.10 Permanent Virtual Circuits

A Permanent Virtual Circuit (PVC) is a logical point-to-point circuit between sites. PVCs are low-delay circuits because routing decisions do not need to be made along the way. Permanent means that the circuit is pre-programmed by the carrier as a path through the network. It does not need to be set up or torn down for each session. PVCs are also called virtual channels.

The system can handle multiple IEEE 802.1p priority queues on a single PVC. You can also define up to eight PVCs on a DSL port and use them for different services or levels of service. You set the PVID that is assigned to untagged frames received on each channel. You also set an IEEE 802.1p priority for each of the PVIDs. In this way you can assign different priorities to different channels (and consequently the services that get carried on them or the subscribers that use them).

For example, you want to give high priority to voice service on one of the ADSL ports. First configure a static VLAN on the system for voice on the port. Then do the following:

- Configure a channel on the port for voice service.
- Set the channel to use the PVID of the static VLAN you configured.
- Assign the channel a high priority.

11.10.1 LLC

LLC is a type of encapsulation where one VC (Virtual Circuit) carries multiple protocols with each packet header containing protocol identifying information. Despite the extra bandwidth and processing overhead, this method may be advantageous if it is not practical to have a separate VC for each carried protocol, for example, if charging heavily depends on the number of simultaneous VCs.

11.10.2 VC Mux

VC Mux is a type of encapsulation where, by prior mutual agreement, each protocol is assigned to a specific virtual circuit, for example, VC1 carries IP, VC2 carries IPX, and so on. VC-based multiplexing may be dominant in environments where dynamic creation of large numbers of ATM VCs is fast and economical.

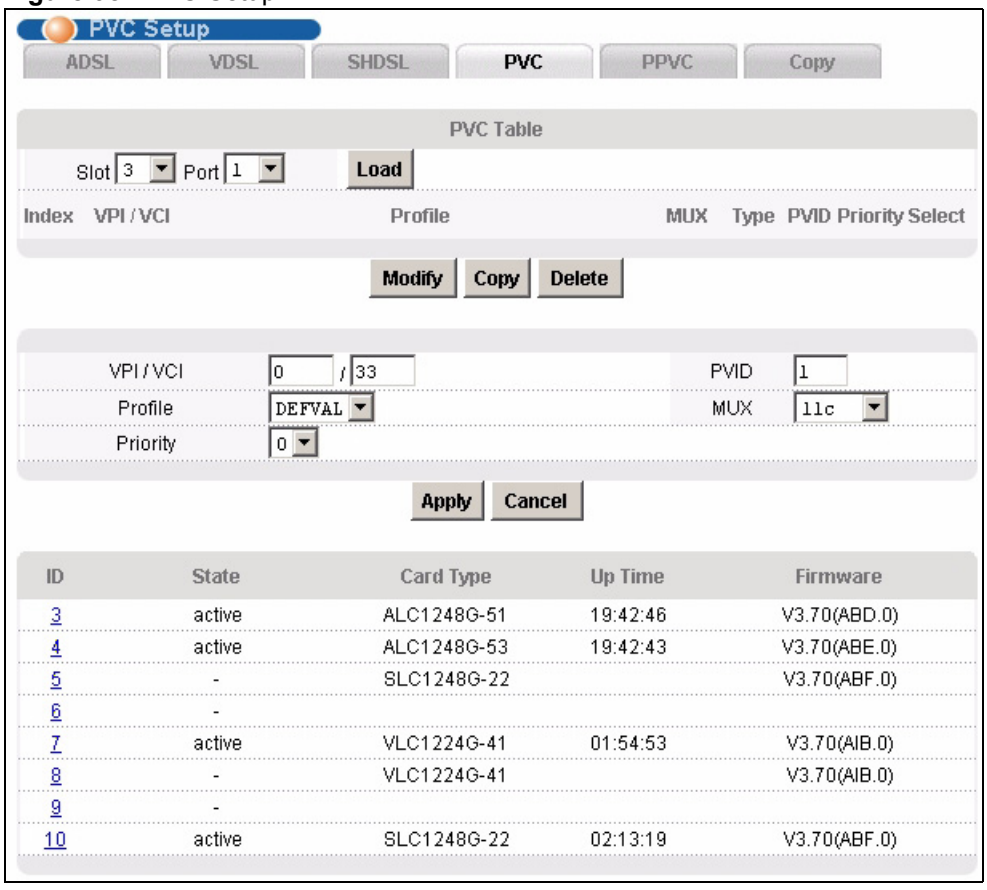
11.10.3 ATM Profiles

Asynchronous Transfer Mode (ATM) is a networking technology that provides high-speed data transfer. ATM uses fixed-size packets of information called cells. With ATM, a high QoS (Quality of Service) can be guaranteed. ATM profiles allow you to configure the virtual channels efficiently. You can configure all of the virtual channels with the same profile, thus removing the need to configure the virtual channels one-by-one. You can also change an individual virtual channel by assigning it a different profile. See the chapter on profiles for information on how to configure ATM profiles.

11.11 PVC Setup Screen

Click **Port > PVC** in the navigation panel to open the following screen. Use this screen to view and configure permanent virtual circuit settings for individual ports.

Figure 98 PVC Setup



The following table describes the fields in this screen.

Table 60 PVC Setup

LABEL	DESCRIPTION
PVC Table	This table displays the PVCs that are configured for the selected port.
Slot	Select the number of a line card's slot.
Port	Select the number of a DSL port on the line card.

Table 60 PVC Setup (continued)

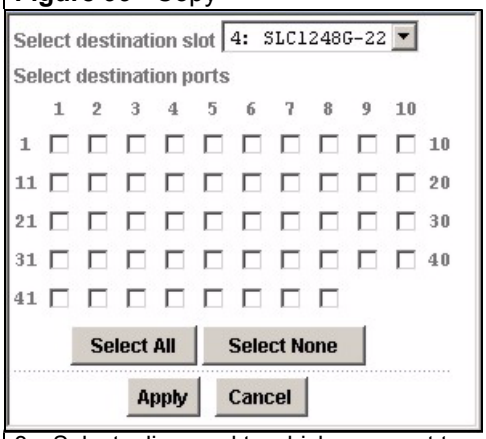
LABEL	DESCRIPTION
Load	Click **Load** to display the port's PVC settings in the **PVC Table**.
Index	This is the number of the PVC on this port. Click a number to open a screen where you can add the PVC to more VLANs (or remove it from VLANs).
VPI / VC	This field displays the Virtual Path Identifier (VPI) and Virtual Circuit Identifier (VCI). The VPI and VCI identify a channel on this port.
Profile	This field displays the ATM profile that this channel uses.
MUX	This field displays the encapsulation type (**llc** or **vc**) for this channel.
Type	This field displays whether the channel is a PVC or a PPVC.
PVID	This field displays the PVID (Port VLAN ID) to assign to untagged frames received on this channel.
Priority	This field displays the priority value (0 to 7) that the line card adds to frames that come in on this PVC without a (IEEE 802.1p) priority tag.
Select	Select a PVC's radio button and then use the **Modify**, **Copy** or **Delete** button.
Modify	Click **Modify** to display the selected PVC's settings in the fields above so you can edit them.
Copy	Do the following to copy VLAN and PVC settings from one DSL port to another DSL port or ports. 1. Use the **Select** column to choose a PVC which you want to copy to another port. 2. Click **Copy** to open the following screen. **Figure 99** Copy  3. Select a line card to which you want to copy settings. 4. Select the check boxes of the DSL ports on the line card to which you want to copy the settings. Click **Select All** to mark all of the port check boxes or click **Select None** to clear all of the port check boxes. 5. Click **Apply** to copy the settings to all of the ports that you have selected in this screen. Click **Cancel** to close the screen without saving changes.
Delete	Click **Delete** to remove the selected PVC.
VPI / VCI	Type the Virtual Path Identifier and Virtual Circuit Identifier for a channel on this port.
PVID	Type a PVID (Port VLAN ID) to assign to untagged frames received on this channel. This must be the VLAN ID of a VLAN that is already configured. The port that you are configuring must also be set to the fixed status in the VLAN.
Profile	Use the drop-down list box to select an ATM profile to assign to this channel.
MUX	Select the encapsulation type (**llc** or **vc**) for this channel.

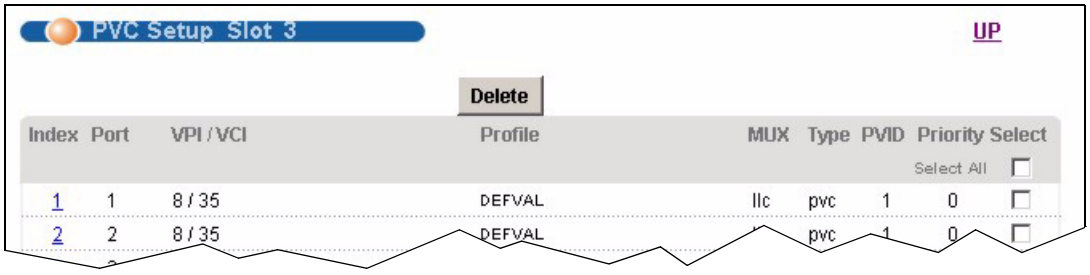
Table 60 PVC Setup (continued)

LABEL	DESCRIPTION
Priority	Type the priority value (0 to 7) to add to incoming frames without a (IEEE 802.1p) priority tag.
Apply	Click **Apply** to save the changes in this screen to the system's volatile memory. The system loses these changes if it is turned off or loses power, so use the **Config Save** on the navigation panel and then the **Save** button to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to begin configuring the screen again.
ID	This column lists the slot numbers of the line cards. Click the ID number of an active DSL line card to go to a screen where you can view and delete PVCs from the line card's DSL ports.
State	This field displays the line card's current operational status. **active** means the line card is operating normally. **init** means the MSC1000G is initializing the line card. **disable** means a manager has disabled the line card. **inactive** means the line card is starting up or is not operating normally. This could be due to the card starting, a firmware upgrade in progress or a malfunction. See Section 34.6 on page 598 for what to do if the line card stays stuck in the inactive state.
Card Type	This field displays the type of a line card.
Up Time	This field displays how long the line card has been running since the last time it was started.
Firmware	This field displays the current firmware version installed on the line card.

11.11.1 PVC Setup Slot Screen

Click **Port > PVC** in the navigation panel to open the **PVC Setup** screen. Click an active ADSL or SHDSL line card's ID number to open the following screen. Use this screen to view and delete PVCs from the line card's DSL ports.

Figure 100 PVC Setup: Slot


PVC Setup Slot 3
UP
Delete
Index Port VPI / VCI Profile MUX Type PVID Priority Select
Select All
1 1 8 / 35 DEFVAL llc pvc 1 0
2 2 8 / 35 DEFVAL pvc 1 0

The following table describes the fields in this screen.

Table 61 PVC Setup: Slot

LABEL	DESCRIPTION
UP	Click this to return to the previous screen.
Delete	Click **Delete** to remove the selected PVC(s).
Index	This is the number of the PVC. Click a number to open a screen where you can add the PVC to more VLANs (or remove it from VLANs).
Port	This is the number of a DSL port on the line card.

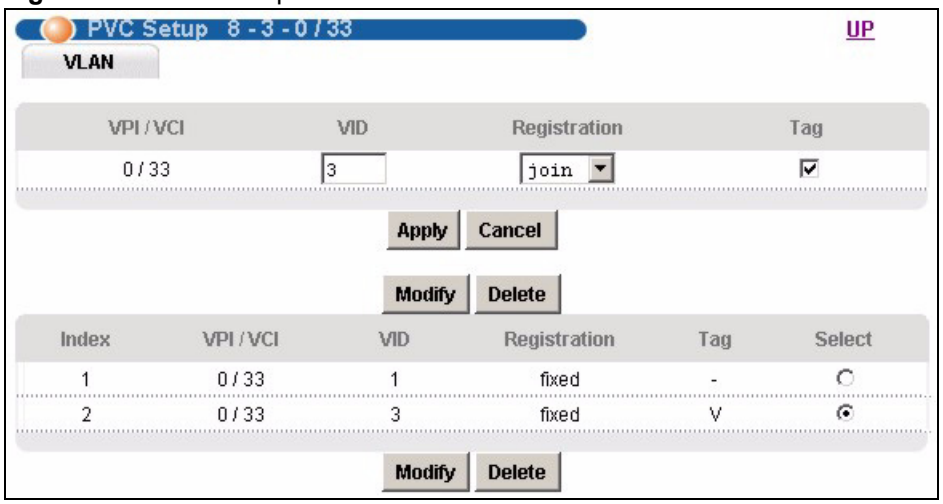
Table 61 PVC Setup: Slot (continued)

LABEL	DESCRIPTION
VPI / VC	This field displays the Virtual Path Identifier (VPI) and Virtual Circuit Identifier (VCI). The VPI and VCI identify a channel on this port.
Profile	This field displays the ATM profile that this channel uses.
MUX	This field displays the encapsulation type (**llc** or **vc**) for this channel.
Type	This field displays whether the channel is a PVC or a PPVC.
PVID	This field displays the PVID (Port VLAN ID) to assign to untagged frames received on this channel.
Priority	This field displays the priority value (0 to 7) that the line card adds to frames that come in on this PVC without a (IEEE 802.1p) priority tag.
Select	Select one or more PVCs' check boxes and then use the **Delete** button to remove it (or them). Use the **Select All** check box to select all of the PVCs for all of the line card's ports.

11.11.2 PVC Setup VLAN Screen

Click **Port > PVC** in the navigation panel to open the **PVC Setup** screen. Click an active ADSL or SHDSL card ID and a PVC's index number to open the following screen. Use this screen to add the PVC to more VLANs (or remove it from VLANs). You can also get to this screen by clicking a PVC's index number in the **PVC Setup Slot** screen.

Figure 101 PVC Setup: VLAN



The following table describes the fields in this screen.

Table 62 PVC Setup: VLAN

LABEL	DESCRIPTION
UP	Click this to return to the previous screen.
VPI / VCI	This field displays the Virtual Path Identifier (VPI) and Virtual Circuit Identifier (VCI). The VPI and VCI identify the channel.
VID	Type a VID (VLAN ID) to add this channel as a member. This must be the VLAN ID of a VLAN that is already configured. The port that you are configuring must also be set to the fixed status in the VLAN.

Table 62 PVC Setup: VLAN (continued)

LABEL	DESCRIPTION
Registration	Select **join** to have the port be a member of the specified VLAN. Select **leave** to remove the port from the specified VLAN.
Tag	Select the check box to tag all frames that are transmitted out on this PVC with this VLAN group ID.
Apply	Click **Apply** to save the changes in this screen to the system's volatile memory. The system loses these changes if it is turned off or loses power, so use the **Config Save** on the navigation panel and then the **Save** button to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to begin configuring the screen again.
The table in the bottom half of the screen lists the VLANs that the PVC is a member of.	
Modify	Click **Modify** to display the selected VLAN membership entry's settings in the fields above so you can edit them.
Delete	Click **Delete** to remove the selected VLAN membership entry.
Index	This is the number of the VLAN membership entry.
VPI / VCI	This field displays the Virtual Path Identifier (VPI) and Virtual Circuit Identifier (VCI). The VPI and VCI identify the channel.
VID	This field displays the number of a VLAN (VLAN ID) of which this channel is a member.
Registration	This field displays "fixed" to indicate that the port is a member of the specified VLAN.
Tag	This field displays "V" if the line card is to tag all frames that are transmitted out on this PVC with this VLAN group ID. It displays "-" if the line card does not tag all frames that are transmitted out on this PVC with this VLAN group ID.
Select	Select the radio button of a VLAN membership entry and then use the **Modify** button or the **Delete** button.

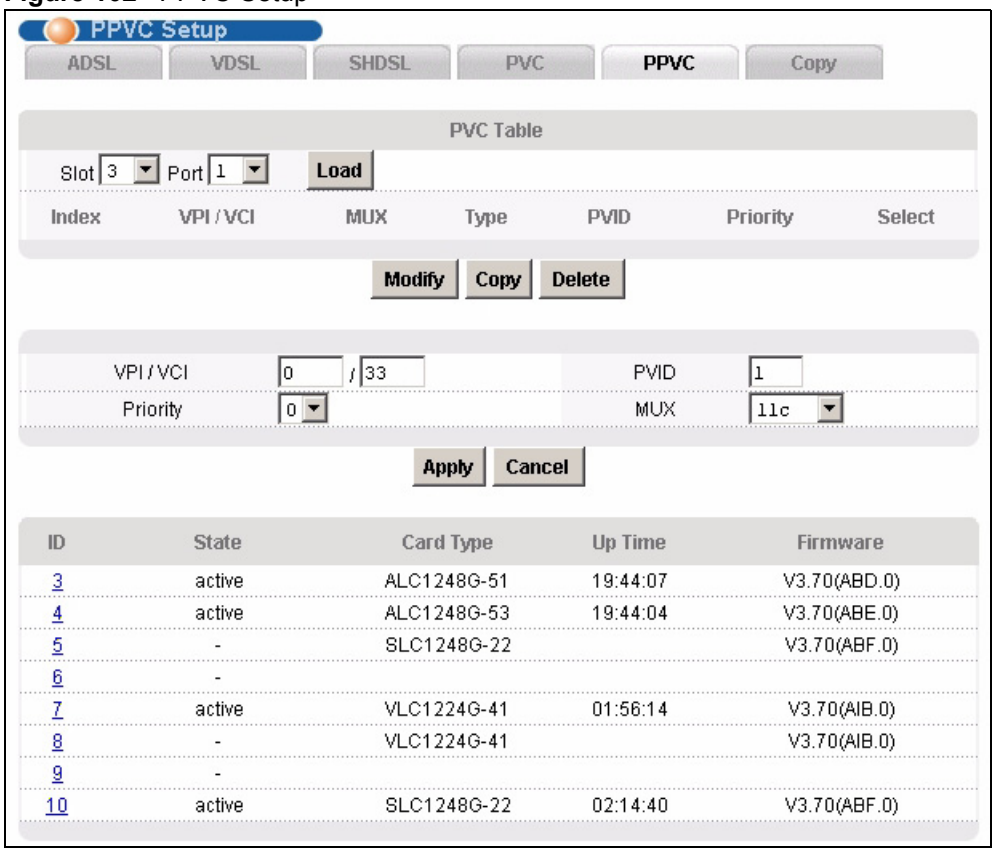
11.12 Priority-based PVCs

A PPVC (Priority-based PVC) allows you to give different priorities to PVCs that are members of the same VLAN. The system maps frames with IEEE 802.1p priorities to PVCs with the matching priority.

11.13 PPVC Setup Screen

Click **Port > PPVC** in the navigation panel to open the following screen. Use this screen to view and configure PPVCs.

Figure 102 PPVC Setup



The following table describes the fields in this screen.

Table 63 PPVC Setup

LABEL	DESCRIPTION
PVC Table	This table displays the PVC's that are configured for the selected port.
Slot	Select the number of an ADSL or SHDSL line card's slot.
Port	Select the number of a DSL port on the line card.
Load	Click **Load** to display the port's PVC settings in the **PVC Table**.
Index	This is the number of the PVC on this port. Click a number to open a screen where you can add the channel to more VLANs (or remove it from VLANs).
VPI / VC	This field displays the Virtual Path Identifier (VPI) and Virtual Circuit Identifier (VCI). The VPI and VCI identify a channel on this port.
MUX	This field displays the encapsulation type (**llc** or **vc**) for this channel.
Type	This field displays whether the channel is a PVC or a PPVC.
PVID	This field displays the PVID (Port VLAN ID) to assign to untagged frames received on this channel.
Priority	This field displays the priority value (0 to 7) that the line card adds to frames that come in on this PVC without a (IEEE 802.1p) priority tag.
Select	Select a PVC's radio button and then use the **Modify**, **Copy** or **Delete** button.
Modify	Click **Modify** to display the selected PVC's settings in the fields above so you can edit them.

Table 63 PPVC Setup (continued)

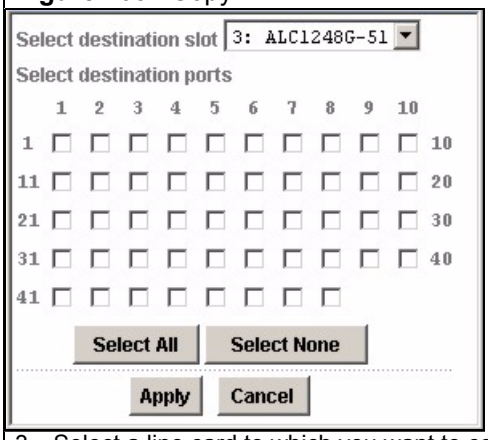
LABEL	DESCRIPTION
Copy	Do the following to copy VLAN and PVC settings from one DSL port to another DSL port or ports. 1. Use the **Select** column to choose a PVC which you want to copy to another port. 2. Click **Copy** to open the following screen. **Figure 103** Copy  3. Select a line card to which you want to copy settings. 4. Select the check boxes of the DSL ports on the line card to which you want to copy the settings. Click **Select All** to mark all of the port check boxes or click **Select None** to clear all of the port check boxes. 5. Click **Apply** to copy the settings to all of the ports that you have selected in this screen. Click **Cancel** to close the screen without saving changes.
Delete	Click **Delete** to remove the selected PVC.
VPI / VCI	Type the Virtual Path Identifier and Virtual Circuit Identifier for a PPVC on this port.
PVID	Type a PVID (Port VLAN ID) to assign to untagged frames received on this PPVC. This must be the VLAN ID of a VLAN that is already configured. The port that you are configuring must also be set to the fixed status in the VLAN.
MUX	Select the encapsulation type (**llc** or **vc**) for this PPVC.
Priority	Type the priority value (0 to 7) to add to incoming frames without a (IEEE 802.1p) priority tag.
Modify	Click **Modify** to display the selected PVC's settings in the fields above so you can edit them.
Apply	Click **Apply** to save the changes in this screen to the system's volatile memory. The system loses these changes if it is turned off or loses power, so use the **Config Save** on the navigation panel and then the **Save** button to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to begin configuring the screen again.
ID	This column lists the slot numbers of the line cards. Click the ID number of an active DSL line card to go to a screen where you can view and delete PVCs from the line card's DSL ports.

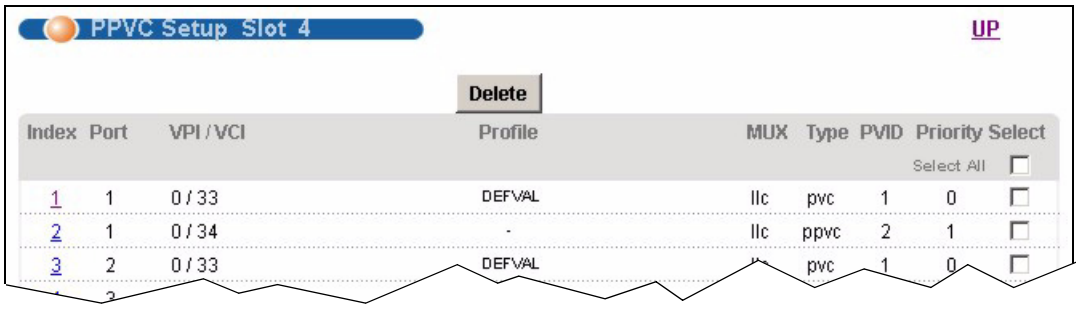
Table 63 PPVC Setup (continued)

LABEL	DESCRIPTION
State	This field displays the line card's current operational status. **active** means the line card is operating normally. **init** means the MSC1000G is initializing the line card. **disable** means a manager has disabled the line card. **inactive** means the line card is starting up or is not operating normally. This could be due to the card starting, a firmware upgrade in progress or a malfunction. See Section 34.6 on page 598 for what to do if the line card stays stuck in the inactive state.
Card Type	This field displays the type of a line card.
Up Time	This field displays how long the line card has been running since the last time it was started.
Firmware	This field displays the current firmware version installed on the line card.

11.13.1 PPVC Setup Slot Screen

Click **Port > PPVC** in the navigation panel to open the **PPVC Setup** screen. Click an active ADSL or SHDSL line card's ID number to open the following screen. Use this screen to view and delete PPVCs from the line card's DSL ports.

Figure 104 PPVC Setup: Slot


PPVC Setup Slot 4
UP
Delete
Index Port VPI / VCI Profile MUX Type PVID Priority Select
Select All
1 1 0 / 33 DEFVAL llc pvc 1 0
2 1 0 / 34 - llc ppvc 2 1
3 2 0 / 33 DEFVAL pvc 1 0

The following table describes the fields in this screen.

Table 64 PPVC Setup: Slot

LABEL	DESCRIPTION
UP	Click this to return to the previous screen.
Delete	Click **Delete** to remove the selected PVC(s).
Index	This is the number of the PVC. Click a number to open a screen where you can add the PVC to more VLANs (or remove it from VLANs).
Port	This is the number of a DSL port on the line card.
VPI / VC	This field displays the Virtual Path Identifier (VPI) and Virtual Circuit Identifier (VCI). The VPI and VCI identify a channel on this port.
Profile	This field displays the ATM profile that this channel uses.
MUX	This field displays the encapsulation type (**llc** or **vc**) for this channel.
Type	This field displays whether the channel is a PVC or a PPVC.
PVID	This field display the PVID (Port VLAN ID) to assign to untagged frames received on this channel.

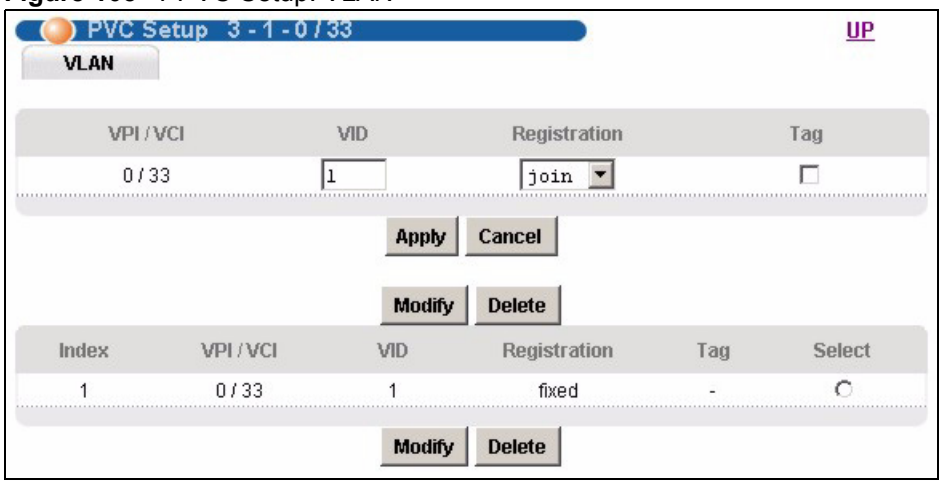
Table 64 PPVC Setup: Slot

LABEL	DESCRIPTION
Priority	This field displays the priority value (0 to 7) that the line card adds to frames that come in on this PVC without a (IEEE 802.1p) priority tag.
Select	Select one or more PVCs' check boxes and then use the **Delete** button to remove it (or them). Use the **Select All** check box to select all of the PVCs for all of the line card's ports.

11.13.2 PPVC Setup VLAN Screen

Click **Port > PPVC** in the navigation panel to open the **PPVC Setup** screen. Click an index number of a card and a PPVC's index number to open the following screen. Use this screen to add the PPVC to more VLANs (or remove it from VLANs). You can also get to this screen by clicking a PPVC's index number in the **PPVC Setup Slot** screen.

Figure 105 PPVC Setup: VLAN



The following table describes the fields in this screen.

Table 65 PPVC Setup: VLAN

LABEL	DESCRIPTION
UP	Click this to return to the previous screen.
VPI / VC	This field displays the Virtual Path Identifier (VPI) and Virtual Circuit Identifier (VCI). The VPI and VCI identify the channel.
VID	Type a VID (VLAN ID) to add this channel as a member. This must be the VLAN ID of a VLAN that is already configured. The port that you are configuring must also be set to the fixed status in the VLAN.
Registration	Select **join** to have the port be a member of the specified VLAN. Select **leave** to remove the port from the specified VLAN.
Tag	Select the check box to tag all frames that are transmitted out on this PPVC with this VLAN group ID.
Apply	Click **Apply** to save the changes in this screen to the system's volatile memory. The system loses these changes if it is turned off or loses power, so use the **Config Save** on the navigation panel and then the **Save** button to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to begin configuring the screen again.
The table in the bottom half of the screen lists the VLANs that the PVC is a member of.	

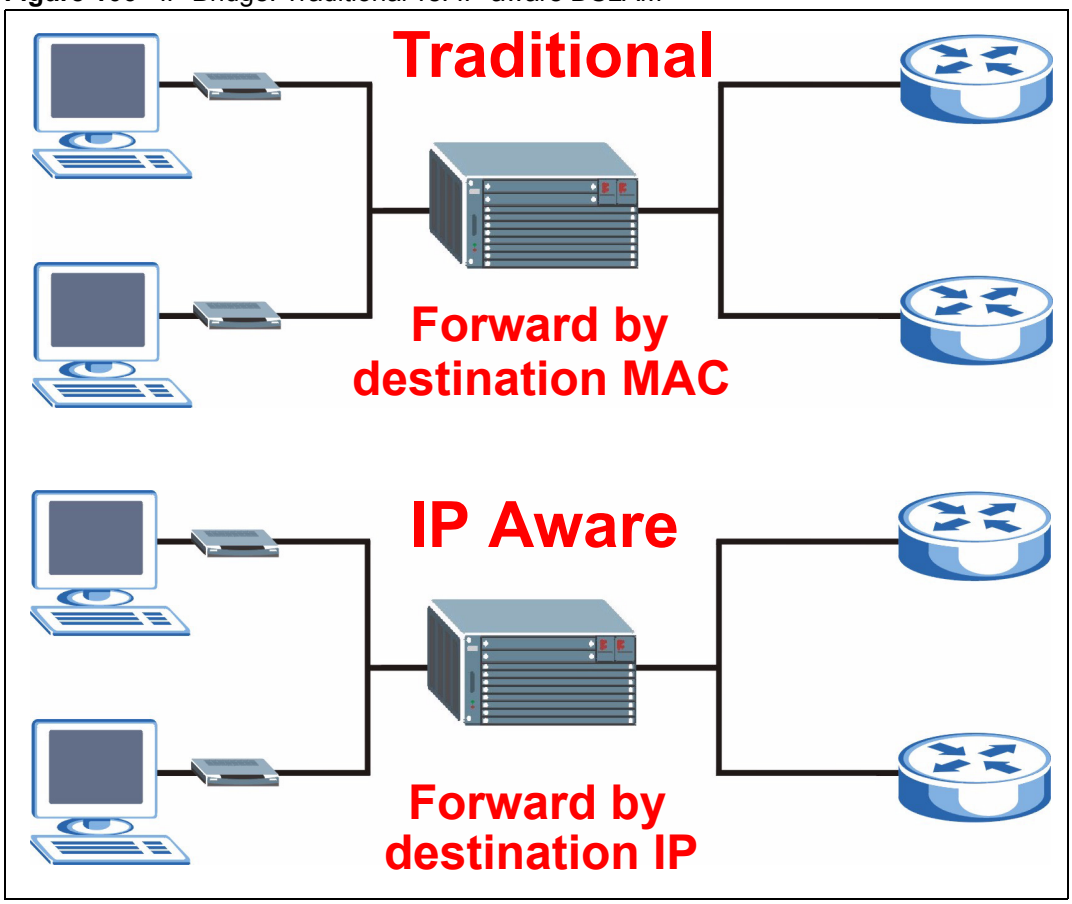
Table 65 PPVC Setup: VLAN (continued)

LABEL	DESCRIPTION
Modify	Click **Modify** to display the selected VLAN membership entry's settings in the fields above so you can edit them.
Delete	Click **Delete** to remove the selected VLAN membership entry.
Index	This is the number of the VLAN membership entry.
VPI / VC	This field displays the Virtual Path Identifier (VPI) and Virtual Circuit Identifier (VCI). The VPI and VCI identify the channel.
VID	This field displays the number of a VLAN (VLAN ID) of which this channel is a member.
Registration	This field displays "fixed" to indicate that the port is a member of the specified VLAN.
Tag	This field displays "V" if the line card is to tag all frames that are transmitted out on this PPVC with this VLAN group ID. It displays "-" if the line card does not tag all frames that are transmitted out on this PPVC with this VLAN group ID.
Select	Select the radio button of a VLAN membership entry and then use the **Modify** button or the **Delete** button.

11.14 IP Bridge Overview

The IP bridge function is designed for large-scale, flat, access networks, and it is ideal when the network is based on Ethernet. When the IP bridge is enabled, the MSC1000G forwards frames based on the destination IP address, instead of the destination MAC address, and it replaces the source MAC address with its own MAC address.

Figure 106 IP Bridge: Traditional vs. IP-aware DSLAM



The IP-aware MSC1000G does not modify the IP packet header, but it uses the destination IP address to modify the layer-2 header, in particular the source MAC address, destination MAC address, and VLAN tag. As a result, the MSC1000G prevents the MAC addresses and VLAN ID downstream of the MSC1000G (in other words, the subscribers' MAC addresses and VLAN ID) from propagating into the network upstream of the MSC1000G, and vice versa.

In the end, the IP-aware MSC1000G makes the network more secure and more scalable, as explained below.

- User-to-user security. The MSC1000G does not forward subscribers' MAC addresses upstream of the MSC1000G, so there is no way for subscribers to know each other's MAC addresses. This prevents the spoofing of MAC addresses and IP addresses upstream of the MSC1000G.
- Scalability. The scale of access networks is typically limited by the number of MAC addresses in the network. Since the MSC1000G does not forward subscribers' MAC addresses or VLAN ID upstream, the upstream network is more scalable, and it is simpler to use the same VLAN ID upstream of several MSC1000G. In addition, the MSC1000G drastically reduces the scale of ARP traffic storms.

The MSC1000G itself is transparent in the network.

11.14.1 Upstream and Downstream Traffic

When the MSC1000G forwards upstream traffic, it makes the following changes in the layer-2 header.

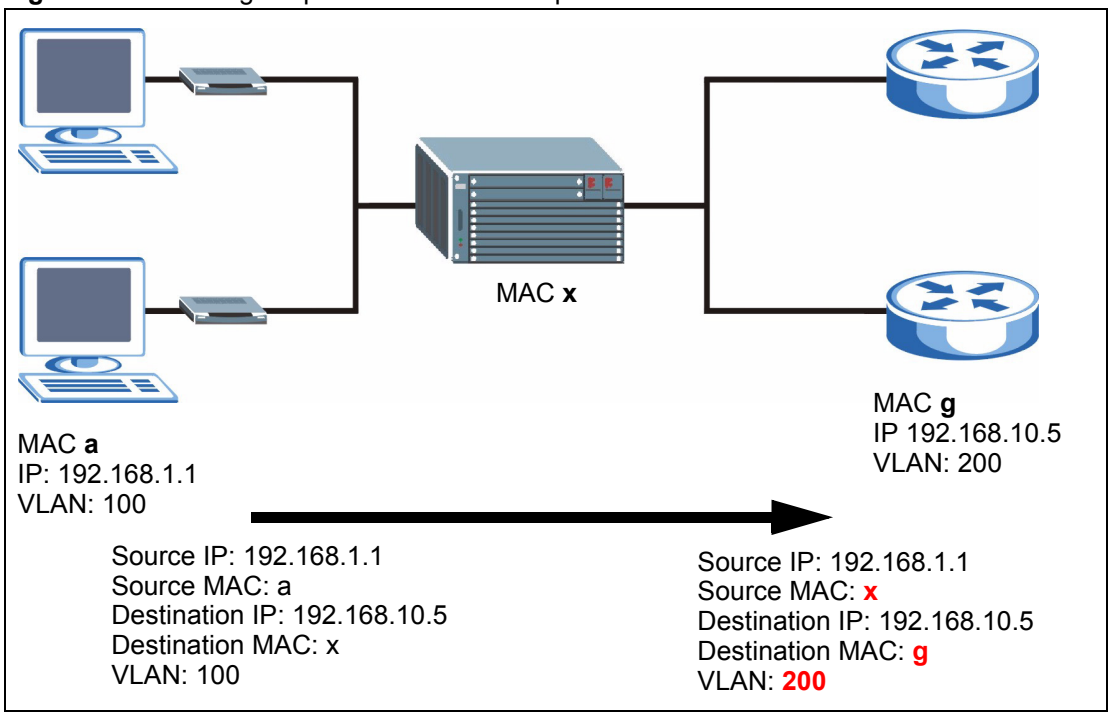
Table 66 IP Bridge: Layer-2 Header for Upstream Traffic

	ORIGINAL	UPDATED
Source MAC address	Subscriber's MAC address	MSC1000G's MAC address
Destination MAC address	MSC1000G's MAC address	Destination IP's MAC address
VLAN ID	Subscriber's VLAN ID	Destination IP's VLAN ID

The original frame has the MSC1000G's MAC address as the destination MAC address because the MSC1000G, not the device that really has the destination IP, responded to the ARP request for the destination IP. (This is part of the ARP proxy feature for IP bridges.) Once the MSC1000G receives the frame, it updates the MAC addresses and VLAN ID and forwards it to the device that really has the destination IP.

This is illustrated in the following example.

Figure 107 IP Bridge: Upstream Traffic Example



Notice that the MSC1000G does not change the IP packet header.

The process is reversed but otherwise similar for downstream traffic. The MSC1000G learns how to forward frames to the appropriate subscriber from one of the following sources.

- DHCP snooping. The IP-aware MSC1000G snoops DHCP packets, so it knows what IP addresses have been assigned to subscribers.
- ARP. The MSC1000G uses ARP to find out which subscriber has a particular IP address.
- Static information. You should provide forwarding information manually for subscribers that have static IP addresses and do not respond to ARP queries.

11.14.2 IP Bridge Settings

The IP bridge function consists of the following settings.

- Domains and VLANs
- Edge routers
- Downlink interfaces
- Routing tables
- PVCs
- ARP proxy settings

Each set of settings is discussed in more detail in the following sections.

11.14.2.1 Domains and VLAN

A domain represents an ISP. Each domain is defined by (and dominates) the VLAN that are in it and has its own routing table and ARP table. As a result, two or more VLANs in different domains can use the same IP subnet, and one network can support multiple ISPs.

VLANs in IP bridges are exclusive. They can be in at most one domain. In addition, VLANs in IP bridges share the same VLAN space as regular VLANs, so VLANs in IP bridges must have different VLAN IDs than regular VLANs.

11.14.2.1.1 Configuring VLANs for Domains

To add a VLAN to a domain,

1. Add (Join) a new (undefined) VLAN ID to the domain.
2. Create the VLAN in the system using the regular screens or commands for VLANs.

To remove a VLAN from a domain,

1. Delete the VLAN from the system using the regular screens or commands for VLANs.
2. Remove (Leave) the VLAN ID from the domain.

11.14.2.2 Edge Routers

Edge routers are usually the gateways that are provided to the subscribers. They can also be gateways that are specified in static routing table entries. Each edge router, in addition to its IP address, has an associated VLAN ID. When the MSC1000G forwards a frame to an edge router, it uses this VLAN ID to replace whatever VLAN ID the subscriber specified. The MSC1000G also uses the VLAN ID to identify the domain the edge router is in.

If two edge routers are in different domains, it is possible for them to have the same IP address.

11.14.2.3 Downlink Interfaces

Downlink interfaces provide forwarding information for downstream traffic. The MSC1000G learns some of this information by snooping DHCP packets. For static IP addresses, you should provide this information manually. In this case, specify the VLAN ID and, optionally, the PVC for a range of IP addresses. The MSC1000G uses the VLAN ID to identify the domain the downlink interface is in. Downlink interfaces in the same domain cannot have overlapping IP addresses.

11.14.2.4 Routing Tables

Each domain has its own routing table. Each routing table contains entries that, based on the destination IP address, control where the MSC1000G forwards packets (for upstream and downstream traffic). The MSC1000G automatically creates routing table entries for each downlink interface and for each edge router in the domain. You can create additional entries by specifying the edge router to which the MSC1000G should forward traffic for a particular destination IP address or IP subnet.

11.14.2.5 PVCs

IP bridge PVCs are similar to regular PVCs and are endpoints of the IP bridge. In addition, IP bridge PVCs are one of two types, IP over Ethernet or IP over ATM, depending on the underlying network.

The PVID is used to identify the domain the PVC is in, so the PVID must be in a domain.

11.14.2.6 ARP Proxy Settings

The MSC1000G is an ARP proxy for edge routers and subscribers in an IP bridge. You can configure basic settings for this, and you can look at (and flush, in some cases) the (PVC, MAC, IP, VID) information the MSC1000G has learned using DHCP snooping and ARP.

11.14.3 IP Bridge Configuration

Follow these steps to set up a simple IP bridge.

1. Create a domain. (Each domain is an ISP.)
2. Create one or more VLANs in the domain. (For example, one VLAN is for high-speed Internet, and another VLAN is for VoIP.)
3. Create the VLAN in the system using the regular screens or commands for VLANs.
4. Specify one or more edge routers for the domain.
5. Create routing table entries, so the MSC1000G forwards frames to the appropriate edge router.
6. Create downlink interfaces, so the MSC1000G forwards frames to the appropriate subscribers.
7. Create PVCs for the subscribers.

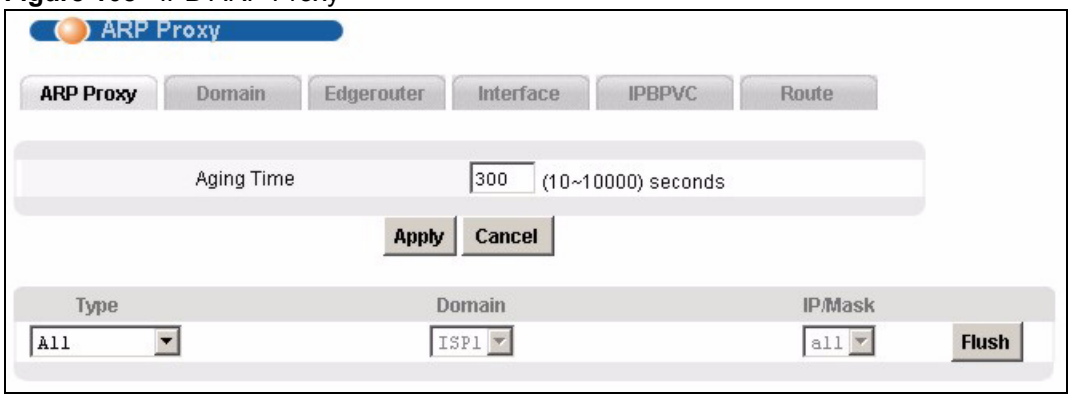
11.15 IPB ARP Proxy Screen

Use this screen to configure how long the MSC1000G keeps entries in the ARP table. You can also flush the Address Resolution Protocol (ARP) table for each domain.

To open this screen, click **Port > IP Bridge**.

See Section 13.7 on page 233 for how to display the ARP table for each domain.

Figure 108 IPB ARP Proxy



The following table describes the labels in this screen.

Table 67 IPB ARP Proxy

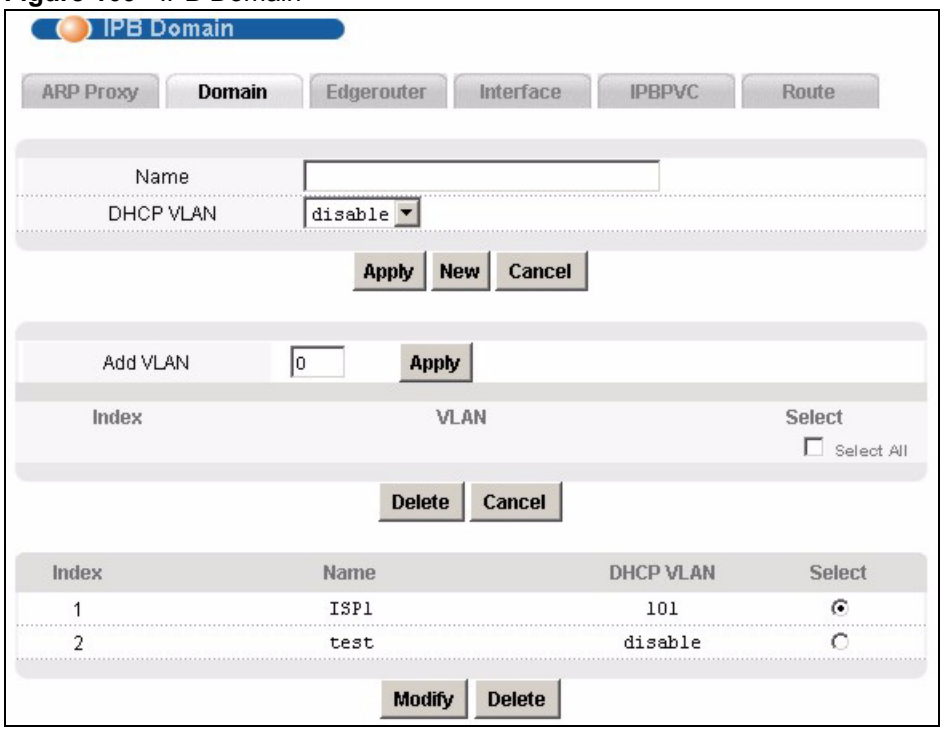
LABEL	DESCRIPTION
Aging Time	Enter a number of seconds (10~10000) to set how long the MSC1000G keeps ARP table entries for IP bridge domains.
Apply	Click **Apply** to save your changes to the MSC1000G's volatile memory. The system loses these changes if it is turned off or loses power, so use the **Config Save** on the navigation panel and then the **Save** button to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to begin configuring the screen again.
Type	Select whether you want to clear edge router, interface (or all) ARP table entries.
Domain	Select the domain whose ARP table you want to clear.
IP/Mask	Select the IP address and subnet mask bit number whose ARP table you want to clear.
Flush	Click **Flush to** remove entries from the ARP table.

11.16 IPB Domain Screen

Use this screen to set up and maintain domains in an IP bridge. A domain represents an ISP. Each domain is defined by (and dominates) the VLAN that are in it and has its own routing table and ARP table.

To open this screen, click **Port > IP Bridge > Domain**.

Figure 109 IPB Domain



The following table describes the labels in this screen.

Table 68 IPB Domain

LABEL	DESCRIPTION
Name	Enter the name of the domain you want to create. You can use 1-31 printable English keyboard characters, except for right angle brackets (>). Spaces are not allowed.
DHCP VLAN	Select the VLAN where the domain's DHCP server is located. If you select a specific VLAN, the MSC1000G forwards subscribers' DHCP packets to the selected VLAN and changes the source MAC address to the MSC1000G's MAC address. Select **Disabled** if there is no DHCP server for the domain, in which case the MSC1000G does not change the source MAC address in DHCP packets. This setting has no effect on DHCP packets that come from VLANs where the MSC1000G's DHCP relay settings are active. See Chapter 16 on page 299. The DHCP relay settings take precedence over the IP bridge DHCP VLAN setting. The MSC1000G also still adds whatever Option 82 information is specified for the VLAN in the DHCP relay settings.
Apply	Click **Apply** to create the domain. It is then displayed in the summary table at the bottom of the screen. Clicking **Apply** saves your changes to the MSC1000G's volatile memory. The MSC1000G loses these changes if it is turned off or loses power, so use the **Config Save** link on the navigation panel to save your changes to the non-volatile memory when you are done configuring.
New	Click **New** to set the screen to configure a new entry.
Cancel	Click **Cancel** to start configuring this section of the screen again.
Add VLAN	Enter the ID of the VLAN you want to add to the domain.

Table 68 IPB Domain (continued)

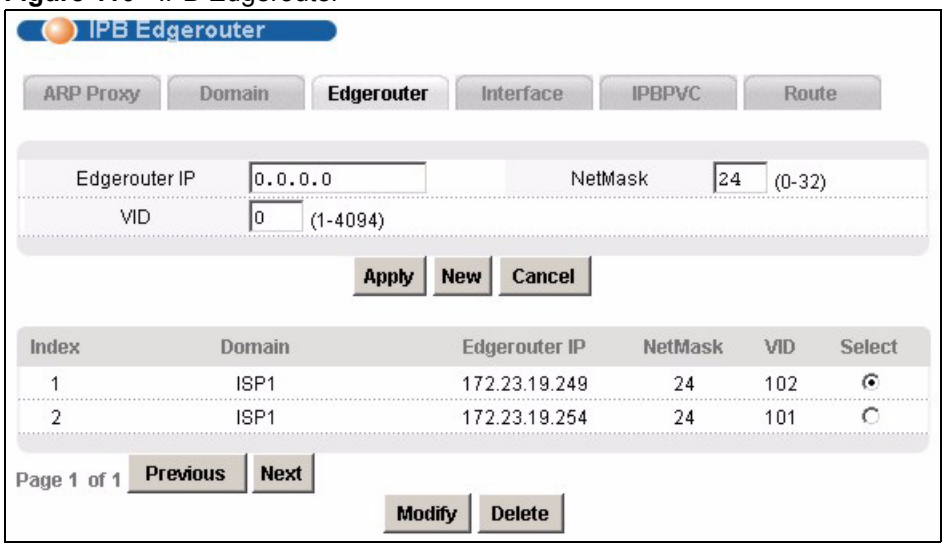
LABEL	DESCRIPTION
Apply	Click **Apply** to add the VLAN to the domain. It then appears in the table below. Clicking **Add** saves your changes to the MSC1000G's volatile memory. The MSC1000G loses these changes if it is turned off or loses power, so use the **Config Save** link on the navigation panel to save your changes to the non-volatile memory when you are done configuring.
Index	This field displays the index number of the VLAN in the domain.
VLAN	This field displays the ID of each VLAN in the domain.
Select	Select the check box in the **Select** column for an entry and click **Delete** to remove the entry. Note: You have to delete every IP bridge setting (including DHCP VLAN) that uses the selected VLAN before you can remove it from the domain.
Select All	Click this to select all entries in the table.
Cancel	Click **Cancel** to start configuring this section of the screen again.
Index	This field displays the number of the domain.
Name	This field displays the name of each domain.
DHCP VLAN	This field displays the VLAN where the domain's DHCP server is located (or **disabled** if there is no DHCP server for the domain).
Select Modify Delete	Select the radio button in the **Select** column for an entry. Click **Modify** to edit the entry or **Delete** to remove it.

11.17 IPB Edgerouter Screen

Use this screen to set up and maintain edge routers in an IP bridge. Edge routers are usually the gateways that are provided to the subscribers. They can also be the gateways that are specified in static routing table entries. If two edge routers are in different domains, it is possible for them to have the same IP address.

To open this screen, click **Port > IP Bridge > Edgerouter**.

Figure 110 IPB Edgerouter



The following table describes the labels in this screen.

Table 69 IPB Edgerouter

LABEL	DESCRIPTION
Edgerouter IP	Enter the IP address of the edge router.
NetMask	Enter the number of bits in the subnet mask of the edge router.
VID	Enter the ID of the VLAN of which the edge router is a member. The MSC1000G uses this VLAN ID when it forwards frames to the edge router. It also uses the VLAN ID to identify the domain the edge router is in. You have to add the VLAN ID to an IP bridge domain before you can enter it here.
Apply	Click **Apply** to create the edge router setting. It is then displayed in the summary table at the bottom of the screen. Clicking **Apply** saves your changes to the MSC1000G's volatile memory. The MSC1000G loses these changes if it is turned off or loses power, so use the **Config Save** link on the navigation panel to save your changes to the non-volatile memory when you are done configuring.
New	Click **New** to set the screen to configure a new entry.
Cancel	Click **Cancel** to start configuring this section of the screen again.
Index	This field displays the number of the edge router.
Domain	This field displays the name of the domain to which the edge router belongs.
Edgerouter IP	This field displays the IP address of the edge router.
NetMask	This field displays the number of bits in the subnet mask of the edge router.
VID	This field displays the VLAN ID of the edge router.
Select Modify Delete	Select the radio button in the **Select** column for an entry and click **Modify** to be able to edit the entry or **Delete** to remove it.
Page X of X	This identifies which page of information is displayed and the total number of pages of information.
Previous/Next	Click one of these buttons to show the preceding/following screen if the information cannot be displayed in one screen.

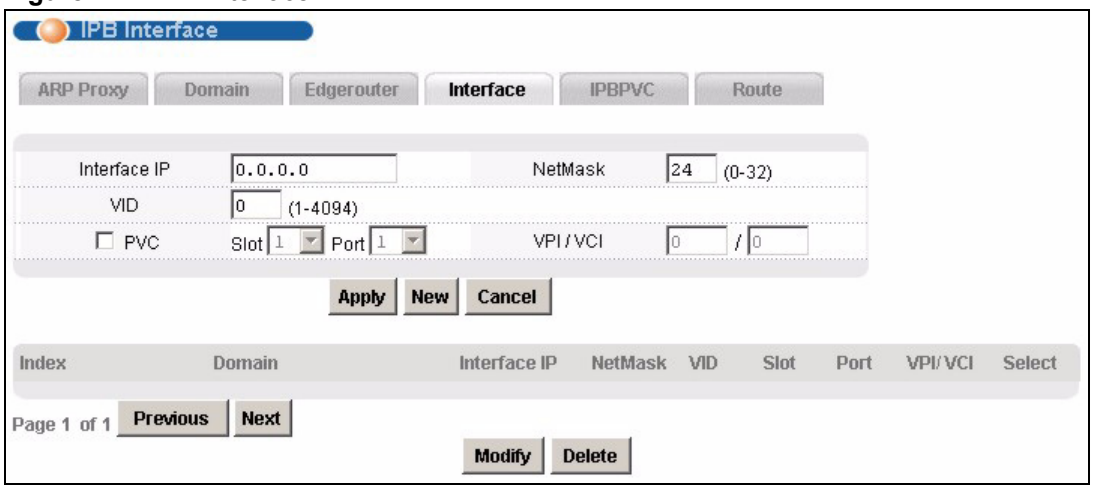
11.18 IPB Interface Screen

Use this screen to set up and maintain forwarding information for downstream traffic. The MSC1000G learns some of this information by snooping DHCP packets. For static IP addresses, you should provide this information manually. Downlink interfaces in the same domain cannot have overlapping IP addresses.

To open this screen, click **Port > IP Bridge > Interface**.

See Section 13.8 on page 234 for how to display all the forwarding information for downstream traffic, whether learned by snooping DHCP packets or provided manually.

Figure 111 IPB Interface



The following table describes the labels in this screen.

Table 70 IPB Interface

LABEL	DESCRIPTION
	Use the top section to create downlink interfaces manually.
Interface IP NetMask	Enter the IP address and the number of bits in the subnet mask that define the range of IP addresses to which this downlink interface applies. If the destination IP address of a packet is in this range, the MSC1000G tries to forward the frame to a subscriber in the specified VLAN or PVC. Downlink interfaces in the same domain cannot have overlapping IP addresses.
VID	Enter the VLAN ID the subscriber is in. The MSC1000G uses this VLAN ID when it forwards frames to the subscriber. It also uses the VLAN ID to identify the domain the downlink interface is in. You have to add the VLAN ID to an IP bridge domain before you can enter it here.
PVC, Slot, Port	Select the **PVC** check box if you want the MSC1000G to forward frames to a specific channel in the specified VLAN. Use the **Slot** and **Port** drop-down list boxes to select the line card and port for the channel. Note: Make sure you specify a valid IP bridge PVC. Do not specify PVCs that are not defined in the **IPBPVC** screen in Section 11.19 on page 196.
VPI/VCI	These fields apply if you select the **PVC** check box. Type the Virtual Path Identifier and Virtual Circuit Identifier for a channel on this port.

Table 70 IPB Interface (continued)

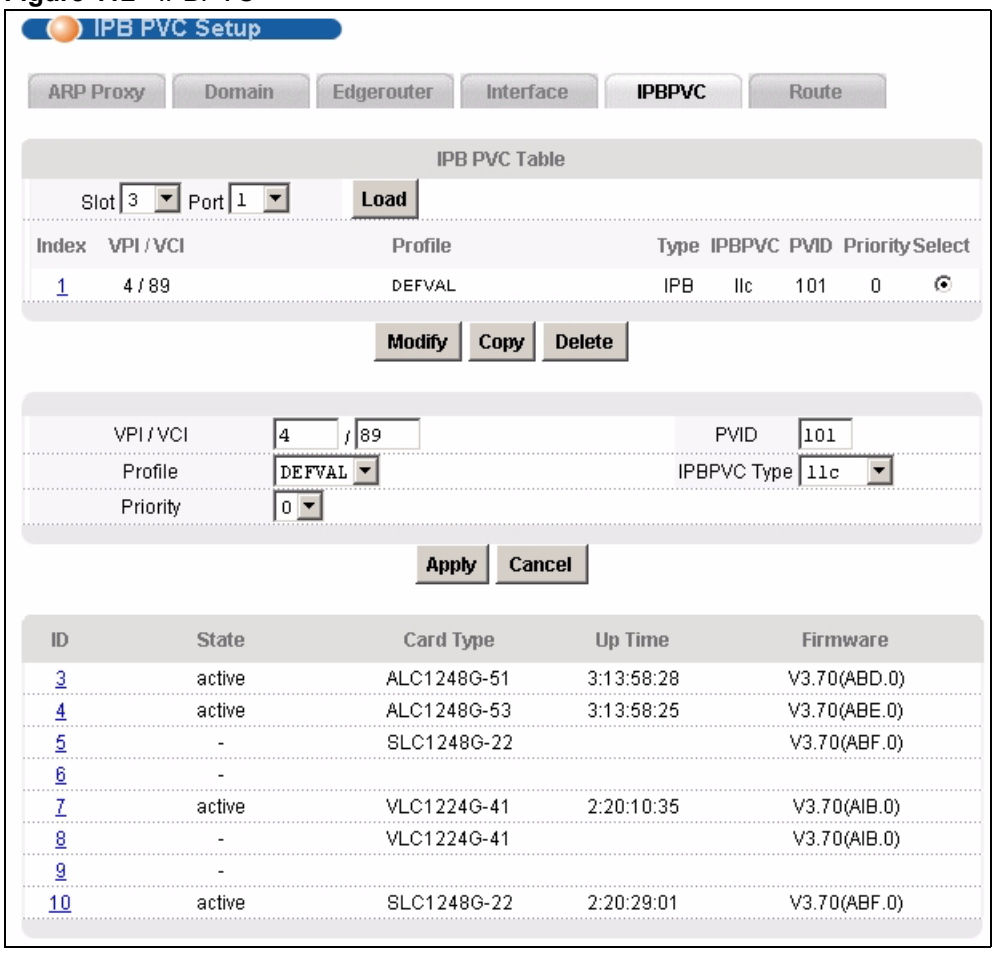
LABEL	DESCRIPTION
Apply	Click **Apply** to create the downlink interface. It is then displayed in the summary table at the bottom of the screen. Clicking **Apply** saves your changes to the MSC1000G's volatile memory. The MSC1000G loses these changes if it is turned off or loses power, so use the **Config Save** link on the navigation panel to save your changes to the non-volatile memory when you are done configuring.
New	Click **New** to set the screen to configure a new entry.
Cancel	Click **Cancel** to start configuring this section of the screen again.
	The bottom section displays downlink interfaces created manually. It does not show forwarding information learned by snooping DHCP packets.
Index	This field displays the index number of the downlink interface.
Domain	This field displays the name of the domain to which the edge router belongs.
Interface IP NetMask	This field displays the IP address and the number of bits in the subnet mask that define the range of IP addresses to which this downlink interface applies. If the destination IP address of a packet is in this range, the MSC1000G tries to forward the frame to a subscriber in the specified VLAN and PVC, if any.
VID	This field displays the VLAN ID the subscriber is in.
Slot	This field displays the number of the slot where the line card is located. It displays "**-**" if the MSC1000G looks for the subscriber in the whole VLAN and not a specific PVC.
Port	This field displays the number of the ADSL port on the line card to which the MSC1000G forwards frames. It displays "**-**" if the MSC1000G looks for the subscriber in the whole VLAN and not a specific PVC.
VPI/VCI	This field displays the Virtual Path Identifier (VPI) and Virtual Circuit Identifier (VCI), if any. The VPI and VCI identify a channel on this port.
Select Modify Delete	Select the radio button in the **Select** column for an entry and click **Modify** to be able to edit the entry or **Delete** to remove it.
Page X of X	This identifies which page of information is displayed and the total number of pages of information.
Previous/Next	Click one of these buttons to show the preceding/following screen if the information cannot be displayed in one screen.

11.19 IPBPVC Screen

Use this screen to set up and maintain PVCs for subscribers in an IP bridge.

To open this screen, click **Port > IP Bridge > IPBPVC**.

Figure 112 IPBPVC



The following table describes the labels in this screen.

Table 71 IPBPVC

LABEL	DESCRIPTION
Slot	Use this drop-down list box to select the slot that contains a line card with a port for which you wish to set up an IP bridge PVC.
Port	Use this drop-down list box to select a port for which you wish to set up an IP bridge PVC.
Load	Click **Load** to display the port's IPB PVC settings in the fields below.
Index	This field displays the index number of a channel on this port. Click the index number to go to a screen where you can configure the IPB PVC's VLAN settings (see Section 11.19.1 on page 199).
VPI/VCI	This field displays the Virtual Path Identifier (VPI) and Virtual Circuit Identifier (VCI). The VPI and VCI identify a channel on this port.
Profile	This shows which ATM profile this channel uses.
Type	This field displays **IPB** to indicate that this is an IPB PVC.
IPBPVC	**llc** and **vc** are for a PVC running on Ethernet (IPoE), **llc_r** and **vc_r** are for a PVC running on ATM (IPoA).
PVID	This is the VLAN ID assigned to frames received on this channel.
Priority	This is the priority value (0 to 7) added to incoming frames without a (IEEE 802.1p) priority tag.

Table 71 IPBPVC (continued)

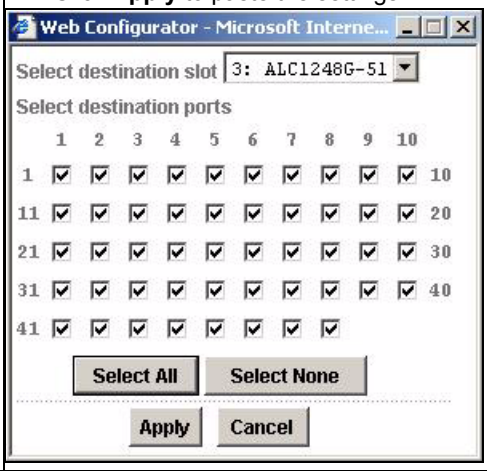
LABEL	DESCRIPTION
Select	Select the radio button in the **Select** column for an entry and click **Modify** to be able to edit the entry, **Copy** to duplicate the entry's settings on another port, or **Delete** to remove the entry.
Modify	Select the radio button in the **Select** column for an entry and click **Modify** to be able to edit the entry.
Copy	Do the following to copy the settings you configure above to another port or ports. 1. Click **Copy**. 2. Select to which line card you want to copy the settings. 3. Select to which ports on the line card you want to copy the settings. Use **Select All** to select every port. Use **Select None** to clear all of the check boxes. 4. Click **Apply** to paste the settings. 
Delete	Select the radio button in the **Select** column for an entry and click **Delete** to remove the entry.
VPI/VCI	Type the Virtual Path Identifier and Virtual Circuit Identifier for a channel on this port.
PVID	Type the VLAN ID to assign to frames received on this channel. This VLAN ID must be in an IP bridge domain.
Profile	Use the drop-down list box to select an ATM profile to use for this channel's traffic shaping.
IPBPVC Type	Use the drop-down list box to specify the encapsulation type for the PVC. **llc** and **vc** are for a PVC running on Ethernet (IPoE), **llc_r** and **vc_r** are for a PVC running on ATM (IPoA).
Priority	Use the drop-down list box to select the priority value (0 to 7) to add to incoming frames without a (IEEE 802.1p) priority tag.
Apply	Click **Apply** to add or save channel settings on the selected port. Clicking **Apply** saves your changes to the MSC1000G's volatile memory. The MSC1000G loses these changes if it is turned off or loses power, so use the **Config Save** link on the navigation panel to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to start configuring the screen again.
ID	This is the slot number of a line card. Click the index number of an active line card that supports PVC to display a list of the IPB PVCs on the selected line card (see Section 11.19.2 on page 200).

Table 71 IPBPVC (continued)

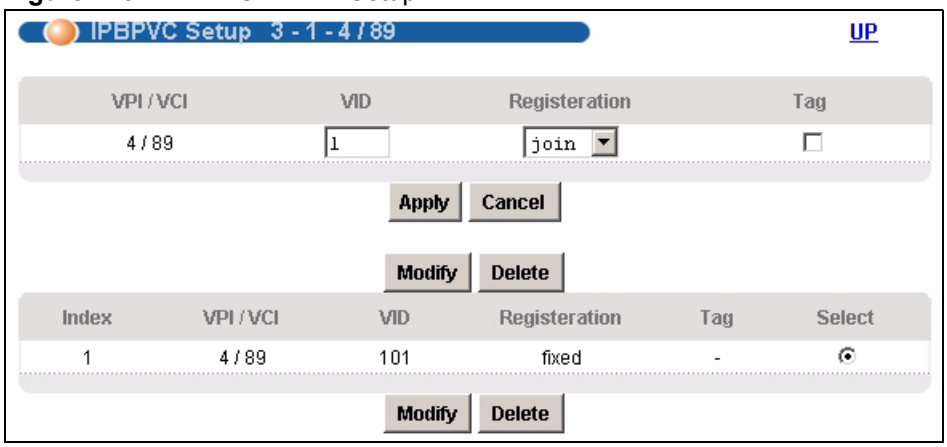
LABEL	DESCRIPTION
State	This field displays the line card's current operational status. **active** means the line card is operating normally. **init** means the MSC1000G is initializing the line card. **disable** means a manager has disabled the line card. **inactive** means the line card is starting up or is not operating normally. This could be due to the card starting, a firmware upgrade in progress or a malfunction. See Section 34.6 on page 598 for what to do if the line card stays stuck in the inactive state.
Card Type	This field displays the type of a line card.
Up Time	This field displays how long the line card has been running since the last time it was started.
Firmware	This field displays the current firmware version installed on the line card.

11.19.1 IPBPVC VLAN Setup Screen

Use this screen to configure a IPB PVC's VLAN settings.

To open this screen, click **Port > IP Bridge > IPBPVC** and then the index number of an IPB PVC .

Figure 113 IPBPVC: VLAN Setup



The following table describes the labels in this screen.

Table 72 IPBPVC: VLAN Setup

LABEL	DESCRIPTION
UP	Click **UP** to go back to the previous screen.
VPI/VCI	This field displays the Virtual Path Identifier (VPI) and Virtual Circuit Identifier (VCI). The VPI and VCI identify a IPB PVC (a channel).
VID	Type the VLAN ID to which this channel belongs. This VLAN ID must be in an IP bridge domain.
Registration	Select **join** to have the port be a member of the specified VLAN. Select **leave** to remove the port from the specified VLAN.
Tag	Select the check box to tag all frames transmitted on this PVC with the port's VID.

Table 72 IPBPVC: VLAN Setup (continued)

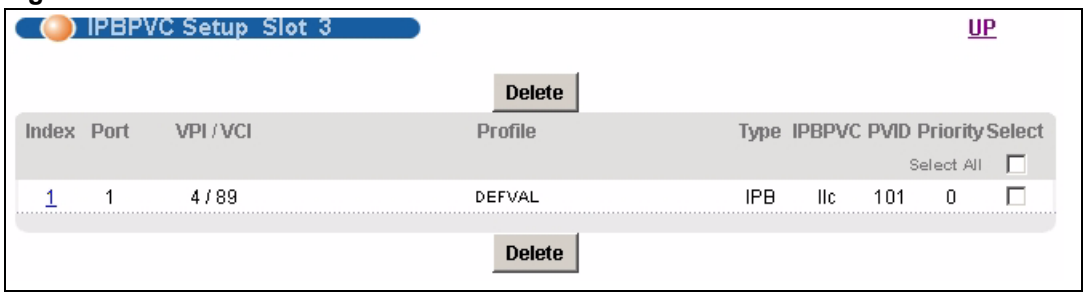
LABEL	DESCRIPTION
Apply	Click **Apply** to save changes on the selected IPB PVC. Clicking **Apply** saves your changes to the MSC1000G's volatile memory. The MSC1000G loses these changes if it is turned off or loses power, so use the **Config Save** link on the navigation panel to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to start configuring the screen again.
Index	This field displays the index number of a IPB PVC on this port.
VPI/VCI	This field displays the Virtual Path Identifier (VPI) and Virtual Circuit Identifier (VCI). The VPI and VCI identify a IPB PVC (a channel).
VID	This is the VLAN ID to which this channel belongs.
Registration	This field displays **fixed** to indicate that the port is a member of the specified VLAN.
Tag	This field displays **V** if the line card is to tag all frames that are transmitted out on this PVC with this VLAN group ID. It displays **-** if the line card does not tag all frames that are transmitted out on this PVC with this VLAN group ID.
Select	Select the radio button in the **Select** column for an entry and click **Modify** to be able to edit the entry, or **Delete** to remove the entry.
Modify	Select the radio button in the **Select** column for an entry and click **Modify** to be able to edit the entry.
Delete	Select the radio button in the **Select** column for an entry and click **Delete** to remove the entry.

11.19.2 IPBPVC by Slot Screen

This screen displays all of the IPB PVCs on a particular line card.

To open this screen, click **Port > IP Bridge > IPBPVC** and then the index number of an active line card that supports PVC .

Figure 114 IPBPVC: Slot


IPBPVC Setup Slot 3
UP
Delete
Index Port VPI / VCI Profile Type IPBPVC PVID Priority Select
Select All
1 1 4 / 89 DEFVAL IPB llc 101 0
Delete

The following table describes the labels in this screen.

Table 73 IPBPVC: Slot

LABEL	DESCRIPTION
UP	Click **UP** to go back to the previous screen.
Delete, Select	Select an entry's **Select** check box and click **Delete** to remove the entry.
Index	This field displays the index number of a IPB PVC on this slot. Click the index number to go to a screen where you can configure the IPB PVC's VLAN settings (see Section 11.19.1 on page 199).

Table 73 IPBPVC: Slot (continued)

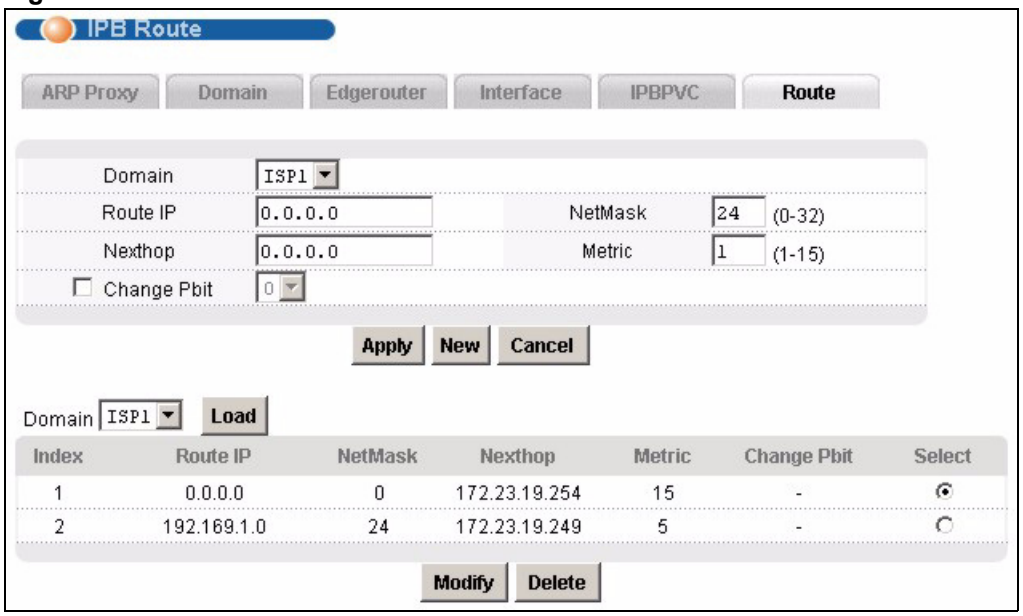
LABEL	DESCRIPTION
Port	This field displays the port number of a port on this line card that has an IPB PVC.
VPI/VCI	This field displays the Virtual Path Identifier (VPI) and Virtual Circuit Identifier (VCI). The VPI and VCI identify a IPB PVC (a channel).
Profile	This shows which ATM profile this channel uses.
Type	This field displays **IPB** to indicate that this is an IPB PVC.
IPBPVC	**llc** and **vc** are for a PVC running on Ethernet (IPoE), **llc_r** and **vc_r** are for a PVC running on ATM (IPoA).
PVID	This is the VLAN ID assigned to frames received on this channel.
Priority	This is the priority value (0 to 7) added to incoming frames without a (IEEE 802.1p) priority tag.
Select	Select the radio button in the **Select** column for an entry and click **Delete** to remove the entry.

11.20 IPB Route Screen

Use this screen to set up and maintain the routing table for each domain. Each routing table contains entries that, based on the destination IP address, control where the MSC1000G forwards packets. The MSC1000G automatically creates routing table entries for each downlink interface and for each edge router in the domain that the associated VLAN is in. You can create additional entries by specifying the edge router to which the MSC1000G should forward traffic for a particular destination IP address or IP subnet.

To open this screen, click **Port > IP Bridge > Route**.

Figure 115 IPB Route



The following table describes the labels in this screen.

Table 74 IPB Route

LABEL	DESCRIPTION
	Use the top section to create routing table entries manually.
Domain	Select the domain to whose routing table you want to add this entry.
Route IP NetMask	Enter the IP address and the number of bits in the subnet mask that define the range of IP addresses to which this entry applies. If the destination IP address of a packet is in this range, the MSC1000G forwards the frame to the specified edge router.
Nexthop	Enter the IP address to which the MSC1000G forwards frames if the destination IP address of a packet is in the specified range. If this IP address corresponds to an edge router in the edge router screen (see Section 11.17 on page 193), the MSC1000G uses the associated VLAN ID. In addition, • If the edge router is in the same domain as the entry, the entry is used for upstream traffic. • If the edge router is in a different domain than the entry, the entry is used for downstream traffic. If the specified edge router is not set up in the edge router screen, the MSC1000G uses the entry for downstream traffic and does not change the VLAN ID.
Metric	The metric represents the “cost” of transmission for routing purposes. IP routing uses hop count as the measurement of cost, with a minimum of 1 for directly-connected networks. Select the number that approximates the cost for this link The number need not be precise, but it must be between 1 and 15. In practice, 2 or 3 is usually a good number. If two entries have the same metric, the MSC1000G uses the one with the lower IP address.
Change Pbit	If you want to set the IEEE 802.1p priority value of incoming frames, select the check box and use the drop-down list box to select the priority value (0 to 7) to use.
Apply	Click **Apply** to create the routing table entry. It is then displayed in the summary table at the bottom of the screen. Clicking **Apply** saves your changes to the MSC1000G’s volatile memory. The MSC1000G loses these changes if it is turned off or loses power, so use the **Config Save** link on the navigation panel to save your changes to the non-volatile memory when you are done configuring.
New	Click **New** to set the screen to configure a new entry.
Cancel	Click **Cancel** to start configuring this section of the screen again.
	The bottom section displays routing table entries created manually. It does not show entries added automatically by the MSC1000G. See Section 13.9 on page 235 to look at the full routing table(s) for selected domain(s).
Domain	Select a domain for which you wish to view information and click **Load** to display it.
Index	This field displays the number of the entry.
Route IP NetMask	These fields display the IP address and the number of bits in the subnet mask that define the range of IP addresses to which this entry applies. If the destination IP address of a packet is in this range, the MSC1000G forwards the frame to the specified edge router.
Nexthop	This field displays the IP address to which the MSC1000G forwards frames if the destination IP address of a packet is in the specified range.
Metric	This field displays the “cost” of transmission for routing purposes.

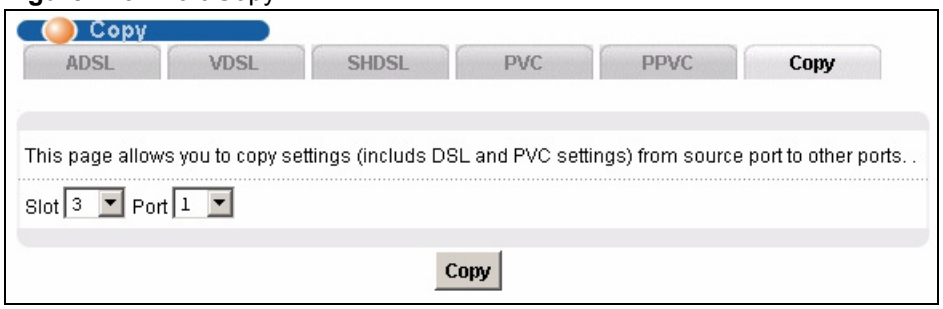
Table 74 IPB Route (continued)

LABEL	DESCRIPTION
Change Pbit	If you set the MSC1000G to change the IEEE 802.1p priority value of incoming frames, this field displays the priority value (0 to 7) to which the MSC1000G sets them. "**-**" displays if you do not set the MSC1000G to change the IEEE 802.1p priority value of incoming frames.
Select Modify Delete	Select the radio button in the **Select** column for an entry and click **Modify** to be able to edit the entry or **Delete** to remove it.

11.21 Port Copy Screen

Click **Port > Copy** in the navigation panel to open the following screen. Use this screen to copy DSL, VLAN and PVC settings from one DSL port to another DSL port or ports.

Figure 116 Port Copy

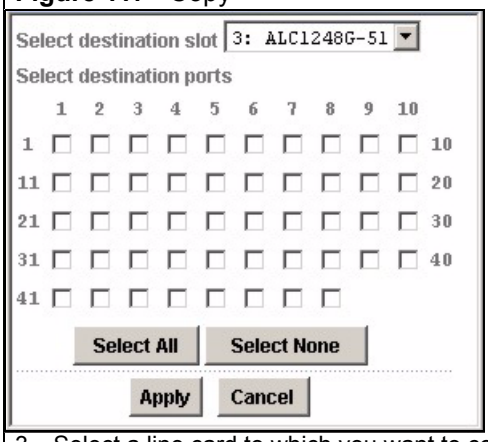


The following table describes the fields in this screen.

Table 75 Port Copy

LABEL	DESCRIPTION
Slot	Select the number of a line card's slot.

Table 75 Port Copy (continued)

LABEL	DESCRIPTION
Port	Select the number of a DSL port on the line card.
Copy	Do the following to copy settings from one DSL port to another DSL port or ports. 1. Use the **Slot** and **Port** drop-down list boxes to select the number of the DSL port from which you want to copy settings. 2. Click **Copy** to open the following screen. **Figure 117** Copy  3. Select a line card to which you want to copy settings. 4. Select the check boxes of the DSL ports on the line card to which you want to copy the settings. Click **Select All** to mark all of the port check boxes or click **Select None** to clear all of the port check boxes. 5. Click **Apply** to copy the settings to all of the ports that you have selected in this screen. Click **Cancel** to close the screen without saving changes.

12

Profile Screens

This chapter describes how to configure profiles to use in assigning settings to the DSL ports.

12.1 Profiles Overview

A profile is a list of settings that you define. Then you can use them to configure one or more individual ports or PVCs. You cannot delete or modify the DEFVAL profiles.

- Use ADSL profiles to configure ADSL port settings.
- Use SHDSL profiles to configure SHDSL port settings.
- Use VDSL profiles to configure VDSL port settings.
- Use ATM profiles to configure ATM traffic shaping settings to be used in configuring PVCs.
- Use alarm ADSL profiles to configure alarm settings for ADSL ports.
- Use alarm SHDSL profiles to configure alarm settings for SHDSL ports.
- Use IGMP filter profiles to configure IGMP filter settings for DSL ports.

12.2 Interleave Delay

Interleave delay is the wait (in milliseconds) that determines the size of a single block of data to be interleaved (assembled) and then transmitted. Interleave delay is used when transmission error correction (Reed- Solomon) is necessary due to a less than ideal telephone line. The bigger the delay, the bigger the data block size, allowing better error correction to be performed.

Reed-Solomon codes are block-based error correcting codes with a wide range of applications. The Reed-Solomon encoder takes a block of digital data and adds extra "redundant" bits. The Reed-Solomon decoder processes each block and attempts to correct errors and recover the original data.

12.2.1 Fast Mode

Fast mode means no interleaving takes place and transmission is faster (a "fast channel"). This would be suitable if you have a good line where little error correction is necessary.

12.3 Configured Versus Actual ADSL Rates

You configure the maximum rate of an individual ADSL port by modifying its profile (see the set profile command) or assigning the port to a different profile (see the set port command). However, due to noise and other factors on the line, the actual rate may not reach the maximum that you specify.

Even though you can specify arbitrary numbers in the set profile command, the actual rate is always a multiple of 32 Kbps for the G.dmt, ANSI T1.413 and G.lite ADSL standards or a multiple of 4 Kbps for the ADSL2 and ADSL2+ standards.

With the G.dmt, ANSI T1.413 and G.lite ADSL standards, if you enter a rate that is not a multiple of 32 Kbps, the actual rate will be the next lower multiple of 32 Kbps. For instance, if you specify 60 Kbps for a port, the actual rate for that port will not exceed 32 Kbps, and if you specify 66 Kbps, the actual rate will not be over 64 Kbps.

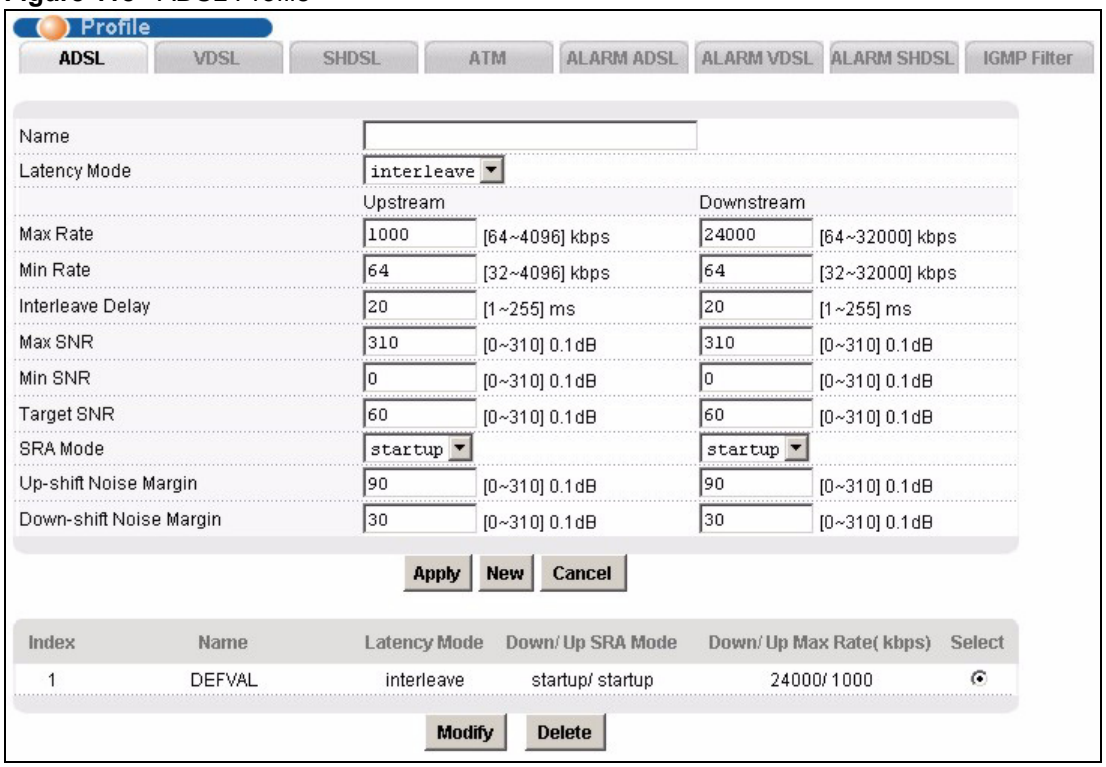
With the ADSL2 and ADSL2+ standards, if you enter a rate that is not a multiple of 4 Kbps, the actual rate will be the next lower multiple of 4 Kbps. For instance, if you specify 67 Kbps for a port, the actual rate for that port will not exceed 64 Kbps, and if you specify 69 Kbps, the actual rate will not be over 68 Kbps.

Note that when you configure an ADSL port, the upstream rate must be less than or equal to the downstream rate. Note also that the list port command displays the configured parameters of the ADSL port, while the show port command displays the actual rates.

12.4 ADSL Profile Screen

Click **Profile > ADSL** in the navigation panel to open the following screen. Use this screen to configure ADSL profiles. Later you can use the ADSL profiles to configure ADSL ports in the **ADSL Port Setup** screens.

Figure 118 ADSL Profile



The following table describes the fields in this screen.

Table 76 ADSL Profile

LABEL	DESCRIPTION
The top part of the screen is for profile configuration.	
Name	When editing a profile, this is the name of this profile. When adding a profile, type a name (up to 31 characters) for the profile.
Latency Mode	This field sets the ADSL latency mode for the ports that belong to this profile. Select **fast** mode to use no interleaving and have faster transmission (a “fast channel”). This would be suitable if you have a good line where little error correction is necessary. Select **interleave** mode to use interleave delay when transmission error correction (Reed- Solomon) is necessary due to a less than ideal telephone line. See Section 12.2 on page 205 for more on interleave delay.
Upstream	The following parameters relate to upstream transmissions.
Max Rate (kbps)	Type a maximum upstream transfer rate for this profile. Configure the maximum upstream transfer rate to be less than the maximum downstream transfer rate.
Min Rate (kbps)	Type the minimum upstream transfer rate for this port. Configure the minimum upstream transfer rate to be less than the maximum upstream transfer rate.
Interleave Delay (ms)	Configure this field when you set the **Latency Mode** field to **Interleave**. Type the number of milliseconds of interleave delay to use for upstream transfers. It is recommended that you configure the same latency delay for both upstream and downstream.
Max SNR (0.1 dB)	Type the maximum upstream signal to noise margin (measured in tenths of a decibel).
Min SNR (0.1 dB)	Type the minimum upstream signal to noise margin (measured in tenths of a decibel). Configure the minimum upstream signal to noise margin to be less than or equal to the maximum upstream signal to noise margin.

Table 76 ADSL Profile (continued)

LABEL	DESCRIPTION
Target SNR (0.1 dB)	Type the target upstream signal to noise margin (measured in tenths of a decibel). Configure the target upstream signal to noise margin to be greater than or equal to the minimum upstream signal to noise margin and less than or equal to the maximum upstream signal to noise margin.
SRA Mode	Select the upstream rate adaptation setting. Select **fix** to not use any rate adaptation. Select **startup** to use rate adaptation at initialization. Select **runtime** to use rate adaptation at any time while the connection is up.
Up-shift Noise Margin (0.1 dB)	The upstream up shift signal to noise margin (measured in tenths of a decibel). When the channel's signal to noise margin goes above this number, the device can attempt to use a higher transfer rate. Configure the upstream up shift signal to noise margin to be greater than or equal to the target upstream signal to noise margin and less than or equal to the maximum upstream signal to noise margin.
Down-shift Noise Margin (0.1 dB)	The upstream down shift signal to noise margin (measured in tenths of a decibel). When the channel's signal to noise margin goes below this number, the device shifts to a lower transfer rate. Configure the upstream down shift signal to noise margin to be less than or equal to the target upstream signal to noise margin and greater than or equal to the minimum upstream signal to noise margin.
Downstream	The following parameters relate to downstream transmissions.
Max Rate (kbps)	Type a maximum downstream transfer rate for this port. Configure the maximum downstream transfer rate to be greater than the maximum upstream transfer rate.
Min Rate (Kbps)	Type the minimum downstream transfer rate for this port. Configure the minimum downstream transfer rate to be less than the maximum downstream transfer rate.
Interleave Delay (ms)	Configure this field when you set the Latency Mode field to interleave. Type the number of milliseconds of interleave delay to use for upstream transfers. It is recommended that you configure the same latency delay for both upstream and downstream.
Max SNR (0.1 dB)	Type the maximum downstream signal to noise margin (measured in tenths of a decibel).
Min SNR (0.1 dB)	Type the minimum downstream signal to noise margin (measured in tenths of a decibel). Configure the minimum downstream signal to noise margin to be less than or equal to the maximum downstream signal to noise margin.
Target SNR (0.1 dB)	Type the target downstream signal to noise margin (measured in tenths of a decibel). Configure the target downstream signal to noise margin to be greater than or equal to the minimum downstream signal to noise margin and less than or equal to the maximum downstream signal to noise margin.
SRA Mode	Select the downstream rate adaptation setting. Select **fix** to not use any rate adaptation. Select **startup** to use rate adaptation at initialization. Select **runtime** to use rate adaptation at any time while the connection is up.
Up-shift Noise Margin (0.1 dB)	The downstream up shift signal to noise margin (measured in tenths of a decibel). When the channel's signal to noise margin goes above this number, the device can attempt to use a higher transfer rate. Configure the downstream up shift signal to noise margin to be greater than or equal to the target downstream signal to noise margin and less than or equal to the maximum downstream signal to noise margin.
Down-shift Noise Margin (0.1 dB)	The downstream down shift signal to noise margin (measured in tenths of a decibel). When the channel's signal to noise margin goes below this number, the device shifts to a lower transfer rate. Configure the downstream down shift signal to noise margin to be less than or equal to the target downstream signal to noise margin and greater than or equal to the minimum downstream signal to noise margin.

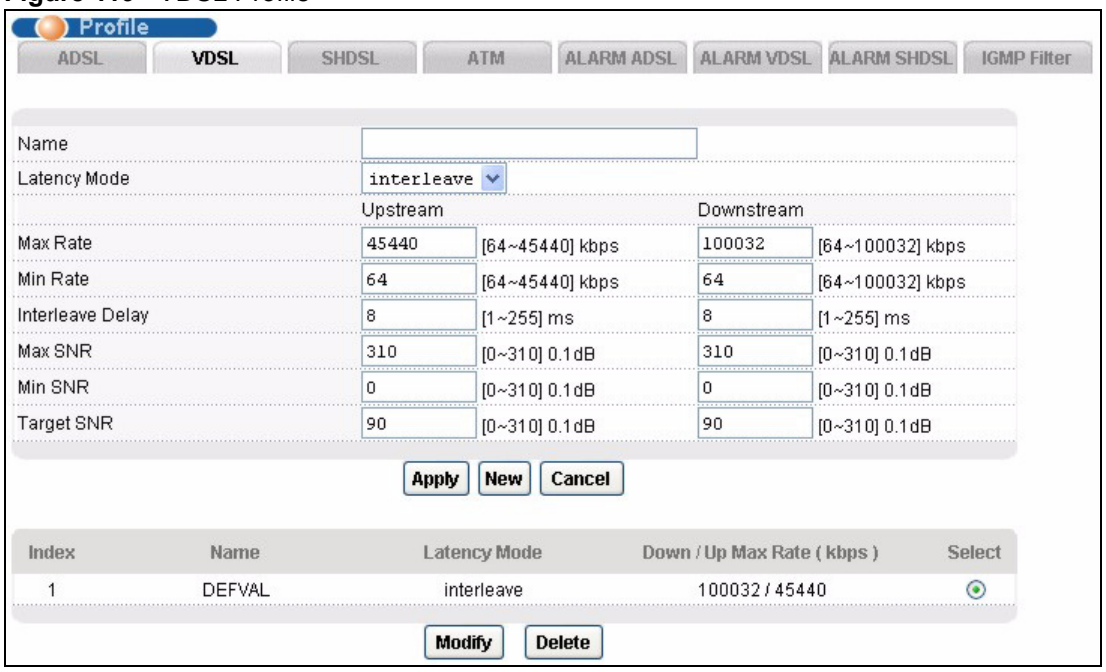
Table 76 ADSL Profile (continued)

LABEL	DESCRIPTION
Apply	Click **Apply** to save the changes in this screen to the system's volatile memory. The system loses these changes if it is turned off or loses power, so use the **Config Save** on the navigation panel and then the **Save** button to save your changes to the non-volatile memory when you are done configuring.
New	While you are modifying a profile, you can click **New** to start configuring a fresh profile without saving your changes.
Cancel	Click **Cancel** to start configuring the screen again.
The bottom part of the screen lists the configured profiles.	
Index	This is the port profile index number.
Name	These are the names of individual profiles. The DEFVAL profile always exists and all of the DSL ports have it assigned to them by default.
Latency Mode	This is the ADSL latency mode (**fast** or **interleave**) for the ports that belong to this profile.
Down/Up SRA Mode	These are the downstream and upstream rate adaptation settings for the ports that belong to this profile.
Down/Up Max Rate (kbps)	These are the maximum downstream and upstream transfer rates for the ports that belong to this profile.
Modify	Select a profile's **Select** radio button and click **Modify** to edit the profile.
Delete	Select a profile's **Select** radio button and click **Delete** to remove the profile.

12.5 VDSL Profile Setup

Click **Profile > VDSL** in the navigation panel to open the following screen. Use this screen to configure VDSL profiles. Later you can use the VDSL profiles to configure VDSL ports in the **VDSL Port Setup** screens.

Figure 119 VDSL Profile



The following table describes the fields in this screen.

Table 77 VDSL Profile

LABEL	DESCRIPTION
The top part of the screen is for profile configuration.	
Name	When editing a profile, this is the name of this profile. When adding a profile, type a name (up to 31 characters) for the profile.
Latency Mode	This field sets the VDSL latency mode for the ports that belong to this profile. Select **fast** mode to use no interleaving and have faster transmission (a “fast channel”). This would be suitable if you have a good line where little error correction is necessary. Select **interleave** mode to use interleave delay when transmission error correction (Reed- Solomon) is necessary due to a less than ideal telephone line. See Section 12.2 on page 205 for more on interleave delay.
Upstream	The following parameters relate to upstream transmissions.
Max Rate (kbps)	Type a maximum upstream transfer rate for this profile. Configure the maximum upstream transfer rate to be less than the maximum downstream transfer rate.
Min Rate (kbps)	Type the minimum upstream transfer rate for this port. Configure the minimum upstream transfer rate to be less than the maximum upstream transfer rate.
Interleave Delay (ms)	Configure this field when you set the **Latency Mode** field to **Interleave**. Type the number of milliseconds of interleave delay to use for upstream transfers. It is recommended that you configure the same latency delay for both upstream and downstream.
Max SNR (0.1 dB)	Type the maximum upstream signal to noise margin (measured in tenths of a decibel).
Min SNR (0.1 dB)	Type the minimum upstream signal to noise margin (measured in tenths of a decibel). Configure the minimum upstream signal to noise margin to be less than or equal to the maximum upstream signal to noise margin.

Table 77 VDSL Profile (continued)

LABEL	DESCRIPTION
Target SNR (0.1 dB)	Type the target upstream signal to noise margin (measured in tenths of a decibel). Configure the target upstream signal to noise margin to be greater than or equal to the minimum upstream signal to noise margin and less than or equal to the maximum upstream signal to noise margin.
Downstream	The following parameters relate to downstream transmissions.
Max Rate (kbps)	Type a maximum downstream transfer rate for this port. Configure the maximum downstream transfer rate to be greater than the maximum upstream transfer rate.
Min Rate (Kbps)	Type the minimum downstream transfer rate for this port. Configure the minimum downstream transfer rate to be less than the maximum downstream transfer rate.
Interleave Delay (ms)	Configure this field when you set the Latency Mode field to interleave. Type the number of milliseconds of interleave delay to use for upstream transfers. It is recommended that you configure the same latency delay for both upstream and downstream.
Max SNR (0.1 dB)	Type the maximum downstream signal to noise margin (measured in tenths of a decibel).
Min SNR (0.1 dB)	Type the minimum downstream signal to noise margin (measured in tenths of a decibel). Configure the minimum downstream signal to noise margin to be less than or equal to the maximum downstream signal to noise margin.
Target SNR (0.1 dB)	Type the target downstream signal to noise margin (measured in tenths of a decibel). Configure the target downstream signal to noise margin to be greater than or equal to the minimum downstream signal to noise margin and less than or equal to the maximum downstream signal to noise margin.
Apply	Click **Apply** to save the changes in this screen to the system's volatile memory. The system loses these changes if it is turned off or loses power, so use the **Config Save** on the navigation panel and then the **Save** button to save your changes to the non-volatile memory when you are done configuring.
New	While you are modifying a profile, you can click **New** to start configuring a fresh profile without saving your changes.
Cancel	Click **Cancel** to start configuring the screen again.
The bottom part of the screen lists the configured profiles.	
Index	This is the port profile index number.
Name	These are the names of individual profiles. The DEFVAL profile always exists and all of the DSL ports have it assigned to them by default.
Latency Mode	This is the VDSL latency mode (**fast** or **interleave**) for the ports that belong to this profile.
Down/Up Max Rate (kbps)	These are the maximum downstream and upstream transfer rates for the ports that belong to this profile.
Modify	Select a profile's **Select** radio button and click **Modify** to edit the profile.
Delete	Select a profile's **Select** radio button and click **Delete** to remove the profile.

12.6 Configured Versus Actual SHDSL Rates

You configure the maximum and minimum rates of individual SHDSL ports using the set profile command. However, due to noise and other factors on the line, the actual rate may not reach the maximum that you specify.

Even though you can specify arbitrary numbers in the set profile command, the actual rate is always a multiple of 64 Kbps. If you enter a rate that is not a multiple of 64 Kbps, the actual value will be the next lower multiple of 64Kbps. For instance, if you specify 2100 Kbps for a port, the actual value will be 2048 Kbps, and if you specify 2120 Kbps, the actual value will be 2112 Kbps.

Note that when you configure a SHDSL profile, the upstream and downstream speeds are the same. The minimum rate must be less than or equal to the maximum rate.

12.7 N-wire Mode

The n-wire mode allows you to physically bundle two SHDSL ports into a single 4-wire connection. The 4-wire mode is described in ITU-T G.991.2. You can use it to connect to SHDSL modems or routers that also support 4-wire mode. N-wire mode also allows you to physically bundle four SHDSL ports into a single 8-wire connection. The 8-wire group is called mpair4.

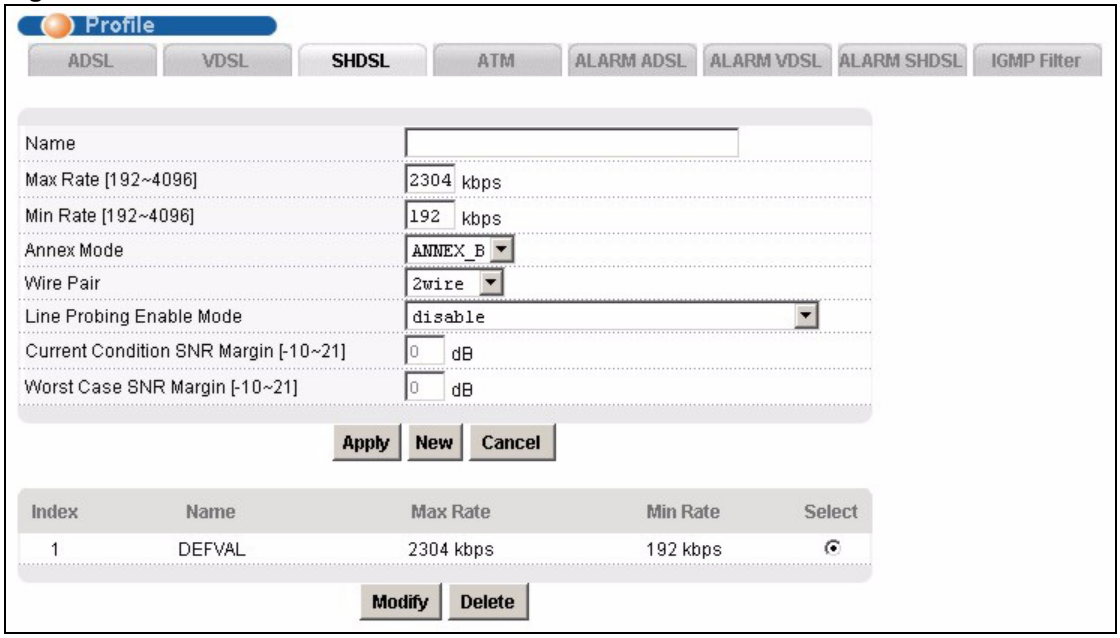
N-wire mode can increase the reach of a particular data rate without having to regenerate the signal. It can also give increased bandwidth for LAN-to-LAN applications.

You can n-wire bundle multiple groups of ports on a single SHDSL line card.

12.8 SHDSL Profile Screen

Click **Profile > SHDSL** in the navigation panel to open the following screen. Use this screen to configure SHDSL profiles. Later you can apply the SHDSL profiles to configure SHDSL ports in the **SHDSL Port Setup** screens.

Figure 120 SHDSL Profile



The following table describes the fields in this screen.

Table 78 SHDSL Profile

LABEL	DESCRIPTION
The top part of the screen is for profile configuration.	
Name	When editing a profile, this is the name of this profile. When adding a profile, type a name (up to 31 characters) for the profile.
Max Rate [192~4096] kbps	Type a maximum transfer rate for this profile.
Min Rate [192~4096] kbps	Type the minimum upstream transfer rate for this profile.
Annex Mode	Select the region setting. Select **ANNEX_A** to use DSL over POTS. Select **ANNEX_B** to use DSL over ISDN.
Wire Pair	Select a wire pair number. Select **2wire** for a normal connection using a single SHDSL port's two wires, this is the default. Select **4wire** for a 4-wire n-wire group (two SHDSL ports grouped together). Select **mpair4** for an 8-wire n-wire group (four SHDSL ports grouped together).
Line Probing Enable Mode	The SHDSL line card and subscriber modem use line probes to determine the best possible transmission rate. This is used in rate adaptation. Disable the line probe to have the system skip the rate adaptation phase to shorten connection set up time. Select **enable (current_condition_ target_SNR)** to enable line probing using the current target Signal to Noise Ratio margin. Select **enable (worst_case_target_SNR)** to enable line probing using the worst case target Signal to Noise Ratio margin.
Current Condition SNR Margin [-10~21]	Type the current condition target Signal to Noise Ratio margin, -10 ~ 21 in dB. You only configure this if you enable line probing using the current target Signal to Noise Ratio margin.
Worst Case SNR Margin [-10~21]	Type the worst case Signal to Noise Ratio margin, -10 ~ 21 in dB. You only configure this if you enable line probing using the worst case target Signal to Noise Ratio margin.
Apply	Click **Apply** to save the changes in this screen to the system's volatile memory. The system loses these changes if it is turned off or loses power, so use the **Config Save** on the navigation panel and then the **Save** button to save your changes to the non-volatile memory when you are done configuring.
New	While you are modifying a profile, you can click **New** to start configuring a fresh profile without saving your changes.
Cancel	Click **Cancel** to start configuring the screen again.
The bottom part of the screen lists the configured profiles.	
Index	This is the port profile index number.
Name	These are the names of individual profiles. The DEFVAL profile always exists and all of the DSL ports have it assigned to them by default.
Max Rate (kbps)	This is the maximum transfer rate (in Kbps) for this profile.
Min Rate (kbps)	This is the minimum upstream transfer rate (in Kbps) for this profile.
Modify	Select a profile's **Select** radio button and click **Modify** to edit the profile.
Delete	Select a profile's **Select** radio button and click **Delete** to remove the profile.

12.9 ATM QoS

ATM Quality of Service (QoS) mechanisms provide the best service on a per-flow guarantee. ATM network infrastructure was designed to provide QoS. It uses fixed cell sizes and built-in traffic management (see the following section on traffic shaping). This allows you to fine-tune the levels of services on the priority of the traffic flow.

12.10 Traffic Shaping

Traffic shaping is an agreement between the carrier and the subscriber to regulate the average rate and fluctuations of data transmission over an ATM network. This agreement helps eliminate congestion, which is important for transmission of real time data such as audio and video connections.

Traffic shaping controls outgoing (downstream) traffic, not incoming (upstream).

12.10.1 ATM Traffic Classes

These are the basic ATM traffic classes defined by the ATM Forum Traffic Management 4.0 Specification.

12.10.1.1 Constant Bit Rate (CBR)

Constant Bit Rate (CBR) is an ATM traffic class that provides fixed bandwidth. CBR traffic is generally time-sensitive (doesn't tolerate delay). CBR is used for connections that continuously require a specific amount of bandwidth. Examples of connections that need CBR would be high-resolution video and voice.

12.10.1.2 Variable Bit Rate (VBR)

The Variable Bit Rate (VBR) ATM traffic class is used with bursty connections. Connections that use the Variable Bit Rate (VBR) traffic class can be grouped into real time (rt-VBR) or non-real time (nrt-VBR) connections.

The rt-VBR (real-time Variable Bit Rate) type is used with bursty connections that require closely controlled delay and delay variation. An example of an rt-VBR connection would be video conferencing. Video conferencing requires real-time data transfers and the bandwidth requirement varies in proportion to the video image's changing dynamics.

The nrt-VBR (non real-time Variable Bit Rate) type is used with bursty connections that do not require closely controlled delay and delay variation. An example of an nrt-VBR connection would be non-time sensitive data file transfers.

12.10.1.3 Unspecified Bit Rate (UBR)

The Unspecified Bit Rate (UBR) ATM traffic class is similar to the ABR traffic class for bursty data transfers. However, while ABR gives subscribers a set amount of bandwidth, UBR doesn't guarantee any bandwidth and only delivers traffic when the network has spare bandwidth.

12.10.2 Traffic Parameters

These are the parameters that control the flow of ATM traffic.

12.10.2.1 Peak Cell Rate (PCR)

Peak Cell Rate (PCR) is the maximum rate at which the sender can send cells. This parameter may be lower (but not higher) than the maximum line speed. 1 ATM cell is 53 bytes (424 bits), so a maximum speed of 832Kbps gives a maximum PCR of 1962 cells/sec. This rate is not guaranteed because it is dependent on the line speed.

12.10.2.2 Sustained Cell Rate (SCR)

Sustained Cell Rate (SCR) is the mean cell rate of each bursty traffic source. It specifies the maximum average rate at which cells can be sent over the virtual connection. SCR may not be greater than the PCR.

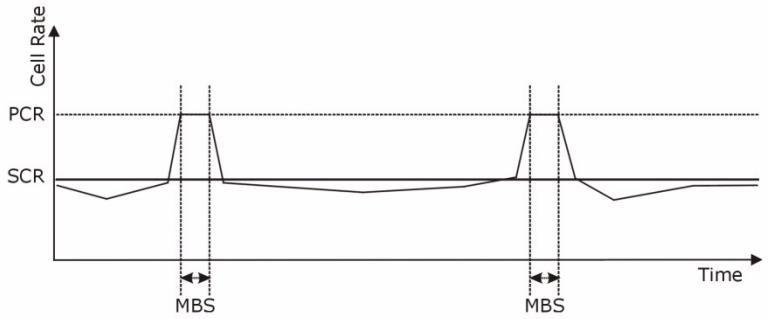
12.10.2.3 Maximum Burst Size (MBS)

Maximum Burst Size (MBS) is the maximum number of cells that can be sent at the PCR. After MBS is reached, cell rates fall below SCR until cell rate averages to the SCR again. At this time, more cells (up to the MBS) can be sent at the PCR again.

If the PCR, SCR or MBS is set to the default of "0", the system will assign a maximum value that correlates to your upstream line rate.

The following figure illustrates the relationship between PCR, SCR and MBS.

Figure 121 PCR, SCR and MBS in Traffic Shaping



12.10.2.4 Cell Delay Variation Tolerance (CDVT)

Cell Delay Variation Tolerance (CDVT) is the accepted tolerance of the difference between a cell's transfer delay and the expected transfer delay. CDVT controls the time scale over which the PCR is enforced. CDVT is used to determine if a cell arrived too early in relation to PCR.

12.10.2.5 Burst Tolerance (BT)

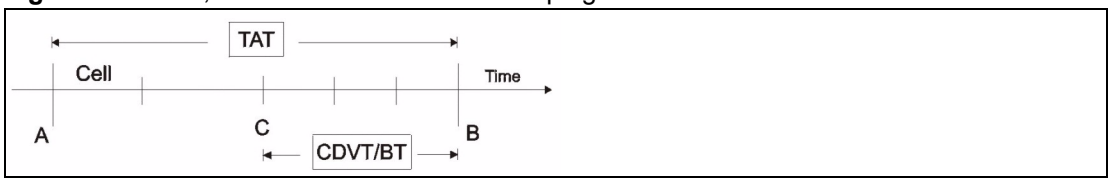
Burst Tolerance (BT) is the maximum number of cells that the port is guaranteed to handle without any discards. BT controls the time scale over which the SCR is enforced. BT is used to determine if a cell arrived too early in relation to SCR. Use this formula to calculate BT: (MBS - 1) x (1 / SCR - 1 / PCR) = BT.

12.10.2.6 Theoretical Arrival Time (TAT)

The Theoretical Arrival Time (TAT) is when the next cell (in an ATM connection's stream of cells) is expected to arrive. TAT is calculated based on the PCR or SCR.

The following figure illustrates the relationship between TAT, CDVT and BT. If a cell arrives at time A, then according to PCR or SCR, the next cell is expected to arrive at time B. If the next cell arrives earlier than time C, it is discarded or tagged for not complying with the TAT. Time C is calculated based on the CDVT or BT.

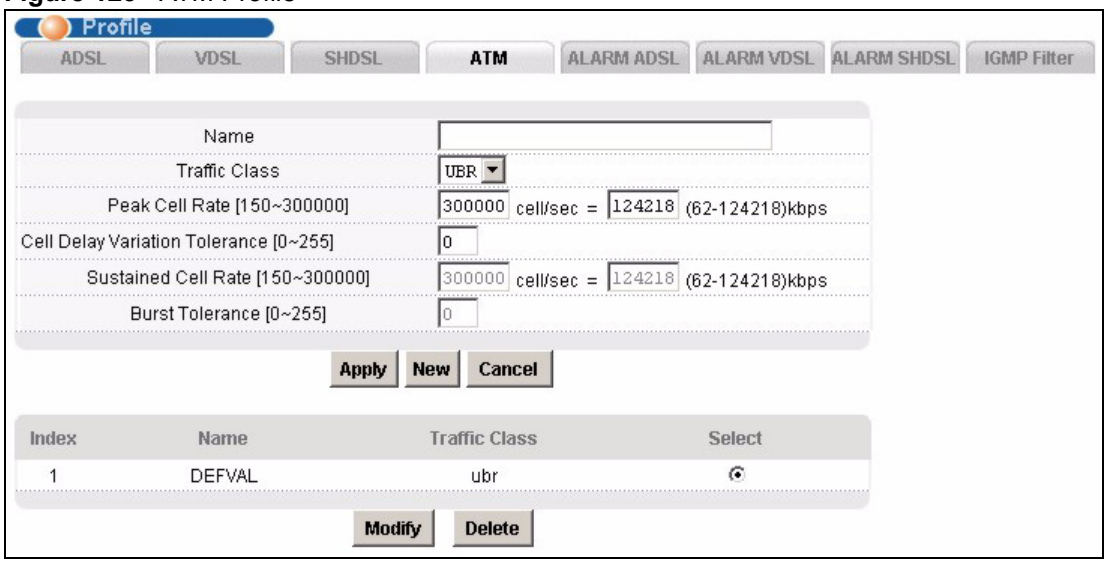
Figure 122 TAT, CDVT and BT in Traffic Shaping



12.11 ATM Profile Screen

Click **Profile > ATM** in the navigation panel to open the following screen. Use this screen to configure ATM profiles. Later you can use the ATM profiles to configure PVCs in the **PVC Setup** screens.

Figure 123 ATM Profile



The following table describes the fields in this screen.

Table 79 ATM Profile

LABEL	DESCRIPTION
The top part of the screen is for profile configuration.	
Name	When editing a profile, this is the name of this profile. When adding a profile, type a name for the profile. You can use up to 31 English keyboard characters; spaces are not allowed.
Traffic Class	Select **CBR** (constant bit rate) to specify fixed (always-on) bandwidth for voice or data traffic. Select **UBR** (unspecified bit rate) for applications that are non-time sensitive, such as e-mail. Select **VBR** (real time variable bit rate) or **NRT** (non real time variable bit rate) for bursty traffic and bandwidth sharing with other applications.
Peak Cell Rate [150~300000]	The Peak Cell Rate is the maximum rate at which the sender can send cells. Peak Cell Rate applies with all of the ATM traffic classes. You can type a number of (ATM) cells per second in the first field or type a number of kilobytes per second in the second field to have the system automatically compute the number of ATM cells per second.
Cell Delay Variation Tolerance [0~255]	Cell Delay Variation Tolerance is the accepted tolerance of the difference between a cell's transfer delay and the expected transfer delay. Cell Delay Variation Tolerance applies with all of the ATM traffic classes. Type the Cell Delay Variation Tolerance here.
Sustained Cell Rate [150~300000]	The Sustained Cell Rate sets the average cell rate (long-term) that can be transmitted. Type the Sustained Cell Rate, which must be less than the Peak Cell Rate. Sustained Cell Rate applies with the variable bit rate traffic classes. You can type a number of (ATM) cells per second in the first field or type a number of kilobytes per second in the second field to have the system automatically compute the number of ATM cells per second.
Burst Tolerance [0~255]	Burst Tolerance sets a maximum number of cells that the port is guaranteed to handle without any discards. Type the Burst Tolerance here. Burst Tolerance applies with the variable bit rate traffic classes.
Apply	Click **Apply** to save the changes in this screen to the system's volatile memory. The system loses these changes if it is turned off or loses power, so use the **Config Save** on the navigation panel and then the **Save** button to save your changes to the non-volatile memory when you are done configuring.

Table 79 ATM Profile (continued)

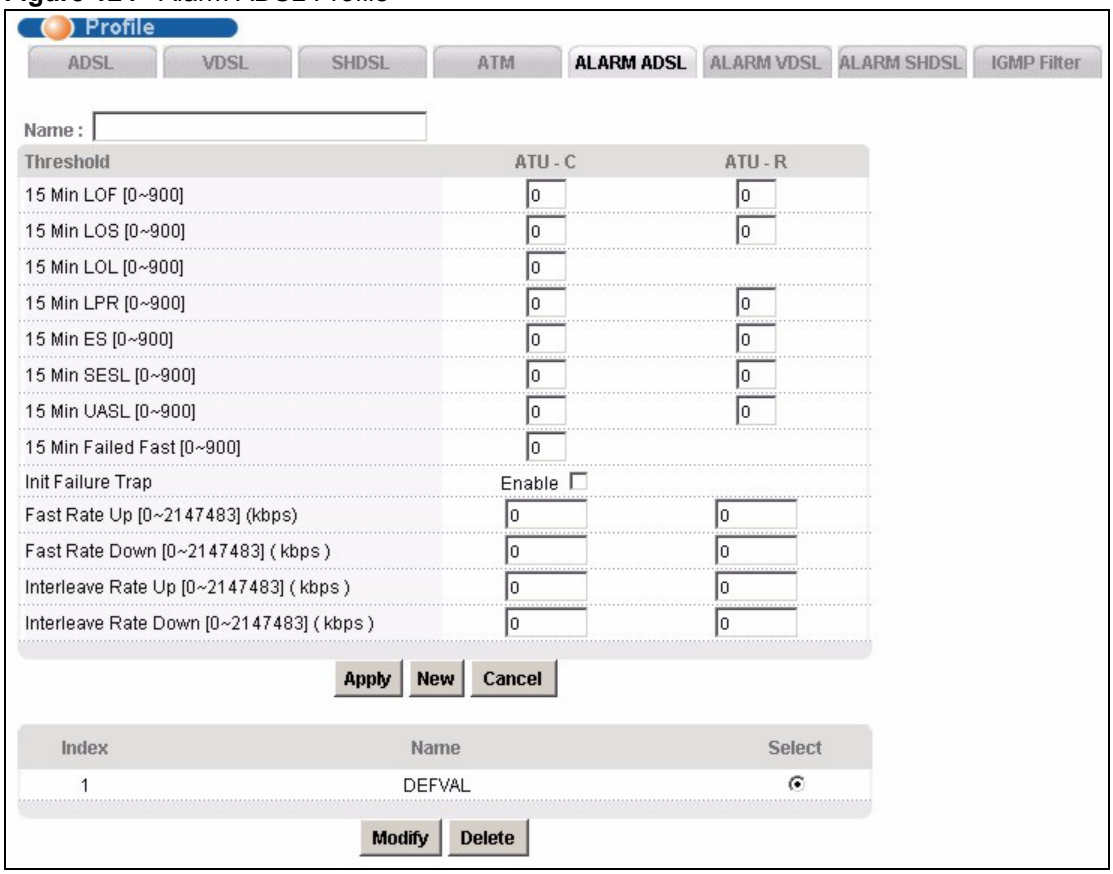
LABEL	DESCRIPTION
New	While you are modifying a profile, you can click **New** to start configuring a fresh profile without saving your changes.
Cancel	Click **Cancel** to start configuring the screen again.
The bottom part of the screen lists the configured profiles.	
Index	This is the number of the ATM profile.
Name	This name identifies the ATM profile.
Traffic Class	This field displays the type of ATM traffic class: **cbr** (constant bit rate), **vbr** (real-time variable bit rate), **nrt** (non-real time variable bit rate) or **ubr** (unspecified bit rate).
Modify	Select a profile's **Select** radio button and click **Modify** to edit the profile.
Delete	Select a profile's **Select** radio button and click **Delete** to remove the profile.

12.12 Alarm ADSL Profile Screen

Click **Profile> Alarm ADSL** in the navigation panel to open the following screen. Use this screen to configure alarm profiles for the ADSL ports. Later you can apply the alarm ADSL profiles to ADSL ports in the **ADSL Port Setup** screens.

Alarm ADSL profiles define ADSL port alarm thresholds. The system sends an alarm trap and generates a syslog entry when the thresholds of the alarm profile are exceeded.

Figure 124 Alarm ADSL Profile



The following table describes the fields in this screen.

Table 80 Alarm ADSL Profile

LABEL	DESCRIPTION
The top part of the screen is for profile configuration.	
Name	Type a name to identify the alarm profile (you cannot change the name of the DEFVAL profile). You can use up to 31 English keyboard characters; spaces are not allowed.
Threshold	Specify limits for the individual performance counters. The system sends an alarm trap and generates a syslog entry when one of these thresholds is exceeded. A value of 0 disables the alarm threshold.
ATU-C	These fields are for traffic coming from the subscriber's device to the system.
ATU-R	These fields are for traffic going from the system to the subscriber's device.
15 Min LOF [0~900]	This field sets the limit for the number of Loss Of Frame seconds that are permitted to occur within 15 minutes.
15 Min LOS [0~900]	This field sets the limit for the number of Loss Of Signal seconds that are permitted to occur within 15 minutes.
15 Min LOL [0~900]	This field sets limit for the number of Loss Of Link seconds that are permitted to occur within 15 minutes.
15 Min LPR [0~900]	This field sets the limit for the number of Loss of Power (on the ATUR) seconds that are permitted to occur within 15 minutes.
15 Min ES [0~900]	This field sets the limit for the number of Errored Seconds that are permitted to occur within 15 minutes.

Table 80 Alarm ADSL Profile (continued)

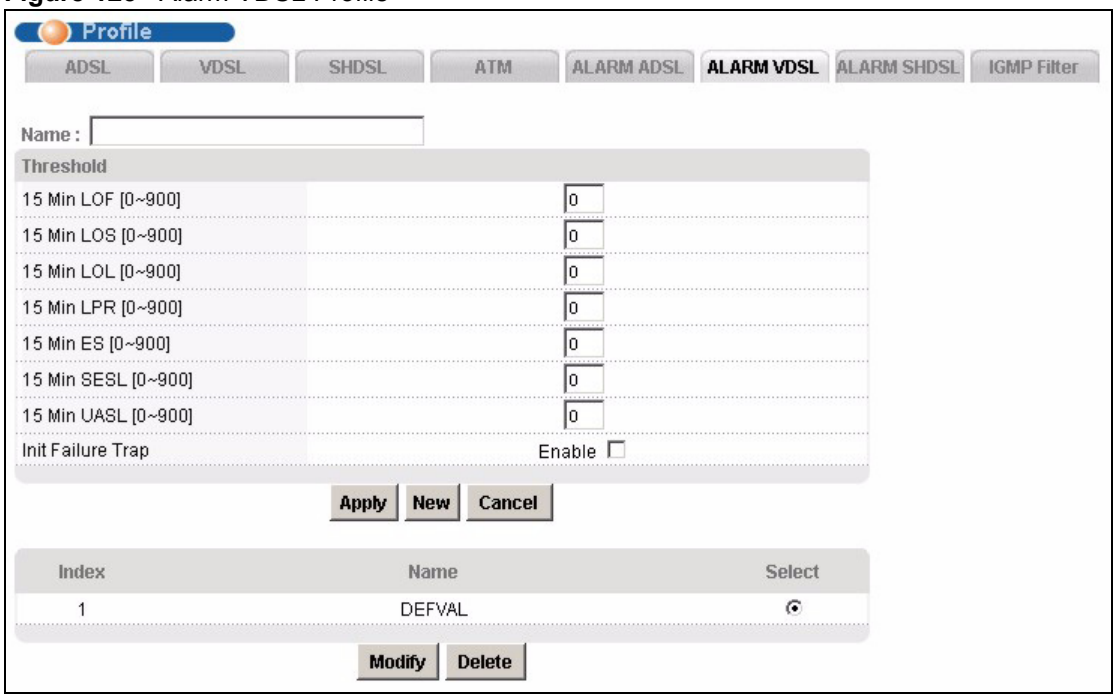
LABEL	DESCRIPTION
15 Min SESL [0~900]	This field sets the limit for the number of Severely Errored Seconds that are permitted to occur within 15 minutes.
15 Min UASL [0~900]	This field sets the limit for the number of UnAvailable Seconds that are permitted to occur within 15 minutes.
15 Min Failed Fast [0~900]	This field sets the limit for the number of failed fast retrain seconds that are permitted to occur within 15 minutes.
Init Failure Trap	Select **Enable** to trigger an alarm for an initialization failure trap.
Fast Rate Up [0~2147483] (kbps)	Specify a rate in kilobits per second (kbps). If a fast mode connection's upstream transmission rate increases by more than this number, then a trap is sent.
Fast Rate Down [0~2147483] (kbps)	Specify a rate in kilobits per second (kbps). If a fast mode connection's downstream transmission rate decreases by more than this number, then a trap is sent.
Interleave Rate Up [0~2147483] (kbps)	Specify a rate in kilobits per second (kbps). If an interleave mode connection's upstream transmission rate increases by more than this number, then a trap is sent.
Interleave Rate Down [0~2147483] (kbps)	Specify a rate in kilobits per second (kbps). If an interleave mode connection's upstream transmission rate decreases by more than this number, then a trap is sent.
Apply	Click **Apply** to save the changes in this screen to the system's volatile memory. The system loses these changes if it is turned off or loses power, so use the **Config Save** on the navigation panel and then the **Save** button to save your changes to the non-volatile memory when you are done configuring.
New	While you are modifying a profile, you can click **New** to start configuring a fresh profile without saving your changes.
Cancel	Click **Cancel** to start configuring the screen again.
The bottom part of the screen lists the configured profiles.	
Index	This is the index number of the alarm profile.
Name	This is the name of the alarm profile.
Modify	Select a profile's **Select** radio button and click **Modify** to edit the profile.
Delete	Select a profile's **Select** radio button and click **Delete** to remove the profile.

12.13 Alarm VDSL Profile Screen

Click **Profile> Alarm VDSL** in the navigation panel to open the following screen. Use this screen to configure alarm profiles for the VDSL ports. Later you can apply the alarm VDSL profiles to VDSL ports in the **VDSL Port Setup** screens.

Alarm VDSL profiles define VDSL port alarm thresholds. The system sends an alarm trap and generates a syslog entry when the thresholds of the alarm profile are exceeded.

Figure 125 Alarm VDSL Profile



The following table describes the fields in this screen.

Table 81 Alarm VDSL Profile

LABEL	DESCRIPTION
The top part of the screen is for profile configuration.	
Name	Type a name to identify the alarm profile (you cannot change the name of the DEFVAL profile). You can use up to 31 English keyboard characters; spaces are not allowed.
Threshold	Specify limits for the individual performance counters. The system sends an alarm trap and generates a syslog entry when one of these thresholds is exceeded. A value of 0 disables the alarm threshold.
15 Min LOF [0~900]	This field sets the limit for the number of Loss Of Frame seconds that are permitted to occur within 15 minutes.
15 Min LOS [0~900]	This field sets the limit for the number of Loss Of Signal seconds that are permitted to occur within 15 minutes.
15 Min LOL [0~900]	This field sets limit for the number of Loss Of Link seconds that are permitted to occur within 15 minutes.
15 Min LPR [0~900]	This field sets the limit for the number of Loss of Power (on the ATUR) seconds that are permitted to occur within 15 minutes.
15 Min ES [0~900]	This field sets the limit for the number of Errored Seconds that are permitted to occur within 15 minutes.
15 Min SESL [0~900]	This field sets the limit for the number of Severely Errored Seconds that are permitted to occur within 15 minutes.
15 Min UASL [0~900]	This field sets the limit for the number of UnAvailable Seconds that are permitted to occur within 15 minutes.
15 Min Failed Fast [0~900]	This field sets the limit for the number of failed fast retrain seconds that are permitted to occur within 15 minutes.
Init Failure Trap	Select **Enable** to trigger an alarm for an initialization failure trap.

Table 81 Alarm VDSL Profile (continued)

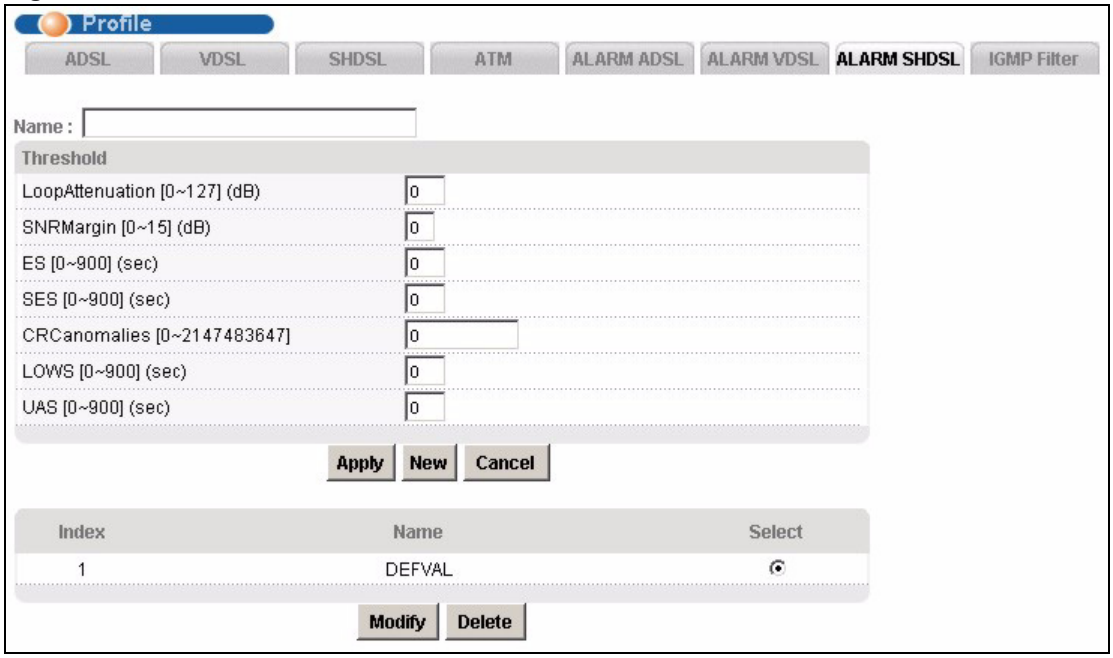
LABEL	DESCRIPTION
Apply	Click **Apply** to save the changes in this screen to the system's volatile memory. The system loses these changes if it is turned off or loses power, so use the **Config Save** on the navigation panel and then the **Save** button to save your changes to the non-volatile memory when you are done configuring.
New	While you are modifying a profile, you can click **New** to start configuring a fresh profile without saving your changes.
Cancel	Click **Cancel** to start configuring the screen again.
The bottom part of the screen lists the configured profiles.	
Index	This is the index number of the alarm profile.
Name	This is the name of the alarm profile.
Modify	Select a profile's **Select** radio button and click **Modify** to edit the profile.
Delete	Select a profile's **Select** radio button and click **Delete** to remove the profile.

12.14 Alarm SHDSL Profile Screen

Click **Profile> Alarm SHDSL** in the navigation panel to open the following screen. Use this screen to configure alarm profiles for the SHDSL ports. Later you can apply the alarm SHDSL profiles to SHDSL ports in the **SHDSL Port Setup** screens.

Alarm SHDSL profiles define SHDSL port alarm thresholds. The system sends an alarm trap and generates a syslog entry when the thresholds of the alarm profile are exceeded.

Figure 126 Alarm SHDSL Profile



The following table describes the fields in this screen.

Table 82 Alarm SHDSL Profile

LABEL	DESCRIPTION
The top part of the screen is for profile configuration.	
Name	Type a name to identify the alarm profile (you cannot change the name of the DEFVAL profile). You can use up to 31 English keyboard characters; spaces are not allowed.
Threshold	Specify limits for the individual performance counters. The system sends an alarm trap and generates a syslog entry when one of these thresholds is exceeded. A value of 0 disables the alarm threshold.
LoopAttenuation [0~127] (dB)	The permitted attenuation (reduction of signal amplitude) of a port's connection.
SNRMargin [0~15] (dB)	The permitted signal to noise ratio margin.
ES [0~900] (sec)	The number of Errored Seconds (0~900) that are permitted to occur within 15 minutes.
SES [0~900] (sec)	The number of Severely Errored Seconds (0~900) that are permitted to occur within 15 minutes.
CRCanomalies [0~2147483647]	The number of Cyclic Redundancy Checking anomalies that are permitted to occur within 15 minutes.
LOWS [0~900] (sec)	The number of Loss Of Sync Word Seconds (0~900) that are permitted to occur within 15 minutes.
UAS [0~900]	The number of UnAvailable Seconds (0~900) that are permitted to occur within 15 minutes.
Apply	Click **Apply** to save the changes in this screen to the system's volatile memory. The system loses these changes if it is turned off or loses power, so use the **Config Save** on the navigation panel and then the **Save** button to save your changes to the non-volatile memory when you are done configuring.
New	While you are modifying a profile, you can click **New** to start configuring a fresh profile without saving your changes.
Cancel	Click **Cancel** to start configuring the screen again.
The bottom part of the screen lists the configured profiles.	
Index	This is the index number of the alarm profile.
Name	This is the name of the alarm profile.
Modify	Select a profile's **Select** radio button and click **Modify** to edit the profile.
Delete	Select a profile's **Select** radio button and click **Delete** to remove the profile.

12.15 IGMP Filter Profile Screen

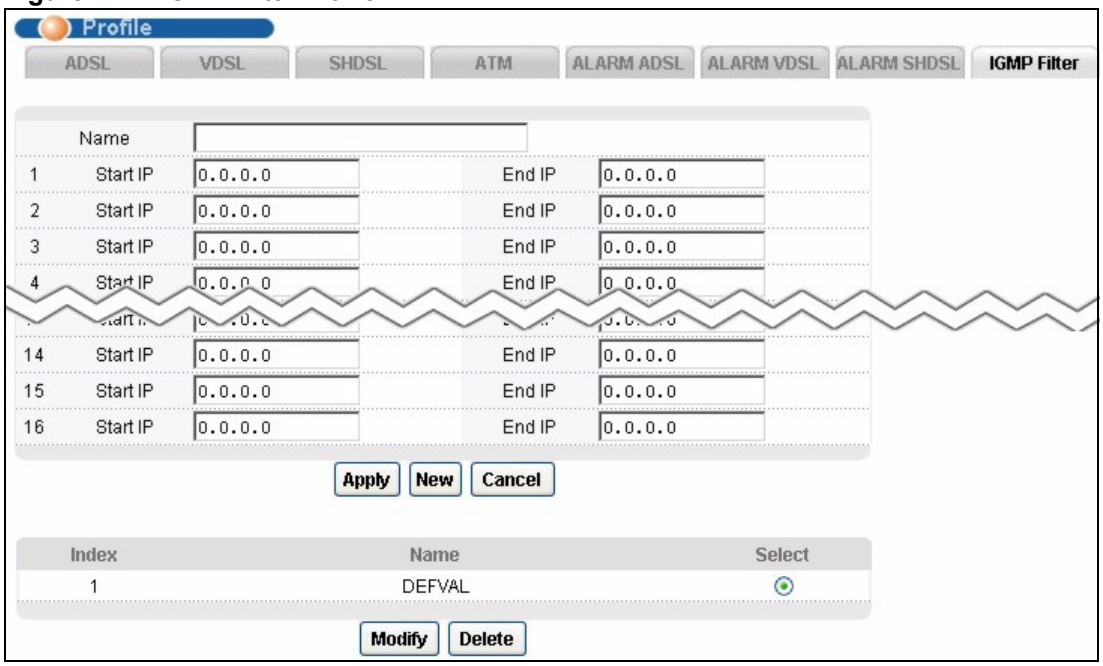
You can use the IGMP filter profiles to control access to a service that uses a specific multicast group (like a SIP server for example). Configure an IGMP filter profile that allows access to that multicast group. Then assign the IGMP filter profile to ADSL ports that are allowed to use the service.

Click **Profile > IGMP Filter** in the navigation panel to open the following screen. Use this screen to configure IGMP filter profiles. Later you can apply the IGMP filter profiles to ADSL ports in the **ADSL Port Setup** screens.

The **DEFVAL** IGMP filter profile is assigned to all ADSL ports by default. It allows a port to join all multicast IP addresses (224.0.0.0~239.255.255.255). If you want to allow an ADSL subscriber access to only specific IGMP multicast groups, use the **IGMP Filter Profile** screen to configure a different profile and then assign it to the subscriber's ADSL port in the **ADSL Port Setting** screens.

Use the top part of the screen to add or edit IGMP filter profiles. The bottom of the screen lists the configured IGMP filter profiles.

Figure 127 IGMP Filter Profile



The following table describes the fields in this screen.

Table 83 IGMP Filter Profile

LABEL	DESCRIPTION
Name	Type a name to identify the IGMP filter profile (you cannot change the name of the DEFVAL profile). You can use up to 31 English keyboard characters; spaces are not allowed.
Start IP	Enter the starting multicast IP address for a range of multicast IP addresses to which you want this IGMP filter profile to allow access.
End IP	Enter the ending multicast IP address for a range of IP addresses to which you want this IGMP filter profile to allow access.If you want to add a single multicast IP address, enter it in both the **Start IP** and **End IP** fields.
Apply	Click **Apply** to save the changes in this screen to the system's volatile memory. The system loses these changes if it is turned off or loses power, so use the **Config Save** on the navigation panel and then the **Save** button to save your changes to the non-volatile memory when you are done configuring.
New	While you are modifying a profile, you can click **New** to start configuring a fresh profile without saving your changes.
Cancel	Click **Cancel** to start configuring the screen again.
Index	This is the index number of the IGMP profile.
Name	This is the name of the IGMP profile.

Table 83 IGMP Filter Profile (continued)

LABEL	DESCRIPTION
Modify	Select a profile's **Select** radio button and click **Modify** to edit the profile.
Delete	Select a profile's **Select** radio button and click **Delete** to remove the profile.

13

Statistics Screens

This chapter describes the run-time statistics.

13.1 ARP Table

Address Resolution Protocol (ARP) is a protocol for mapping an Internet Protocol address (IP address) to a physical machine address, also known as a Media Access Control or MAC address, on the local area network.

An IP (version 4) address is 32 bits long. In an Ethernet LAN, MAC addresses are 48 bits long. The ARP table maintains an association between each MAC address and its corresponding IP address.

13.1.1 How ARP Works

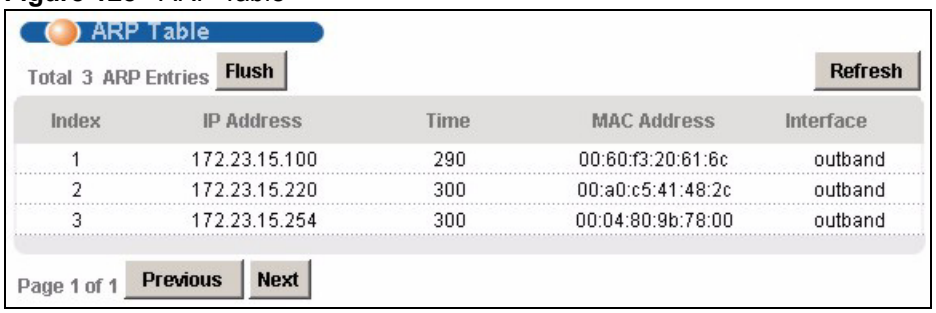
When an incoming packet destined for a host device on a local area network arrives at the switch, the switch's ARP program looks in the ARP Table and, if it finds the address, sends it to the device.

If no entry is found for the IP address, ARP broadcasts the request to all the devices on the LAN. The switch fills in its own MAC and IP address in the sender address fields, and puts the known IP address of the target in the target IP address field. In addition, the switch puts all ones in the target MAC field (FF.FF.FF.FF.FF.FF is the Ethernet broadcast address). The replying device (which is either the IP address of the device being sought or the router that knows the way) replaces the broadcast address with the target's MAC address, swaps the sender and target pairs, and unicasts the answer directly back to the requesting machine. ARP updates the ARP Table for future reference and then sends the packet to the MAC address that replied.

13.2 ARP Table Screen

Click **Statistics > ARP Table** in the navigation panel to open the following screen. This screen lists the IP addresses that the system has mapped to MAC addresses.

Figure 128 ARP Table



The following table describes the labels in this screen.

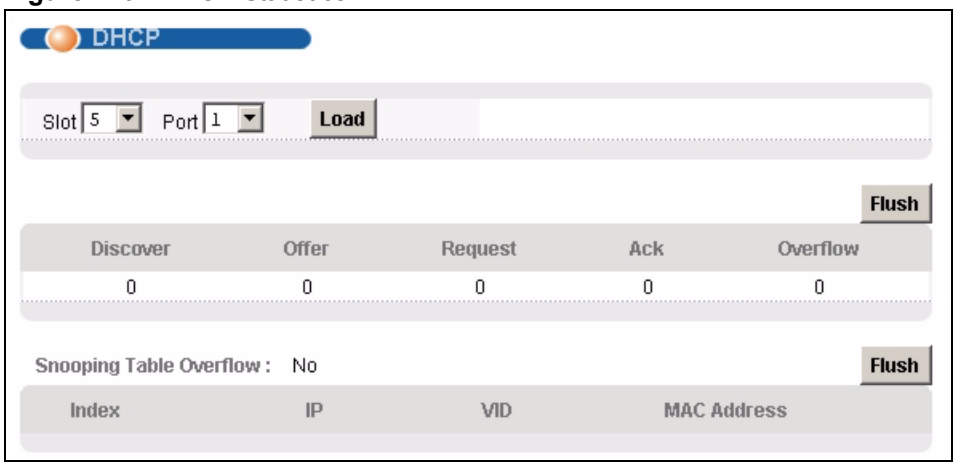
Table 84 ARP Table

LABEL	DESCRIPTION
Total X ARP Entries	This displays the number of entries in the ARP table.
Flush	Click **Flush** to remove all of the entries from the ARP table.
Index	This is the ARP table entry number.
IP Address	This is the learned IP address of a device connected to one of the system's ports.
Time	This is the remaining number of seconds that the entry will remain in the table before it is deleted (unless it is resolved again before the time period expires). An entry can remain in the ARP table for up to 300 seconds after it is created. This is the number of seconds that the entry has been in the table.
MAC Address	This is the MAC address of the device with the listed IP address.
Interface	This identifies to which interface (inband or outband) the device is connected.
Page X of X	This identifies which page of information is displayed and the total number of pages of information.
Previous/Next	Click one of these buttons to show the preceding/following screen if the information cannot be displayed in one screen.

13.3 DHCP

To view DHCP packet counters on a port, click **Statistics > DHCP**.

Figure 129 DHCP Statistics



The following table describes the labels in this screen.

Table 85 DHCP Statistics

LABEL	DESCRIPTION
Slot	Select the number of a line card's slot.
Port	Select the number of a DSL port on the line card.
Load	Click **Load** to retrieve the port's IGMP filter profile setting and display it in the **Profile** drop-down list box.
Flush	Click **Flush** to remove all of the entries from the table below.
Discover	This field displays the number of DHCP Discover packets on this port.
Offer	This field displays the number of DHCP Offer packets on this port.
Request	This field displays the number of DHCP Request packets on this port.
Ack	This field displays the number of DHCP Acknowledge packets on this port.
Overflow	This field displays the number of IP addressees not added to the DHCP snooping table when it is full.
Flush	Click **Flush** to remove all of the entries from the table below.
Snooping Table Overflow	This field displays whether the DHCP snooping table is full or not.
Index	This field displays the index number.
IP	This field displays the IP address assigned to a client n this port.
VID	This field displays the VLAN ID of the VLAN to which the client computer belongs.
MAC Address	This field displays the MAC address of the client computer.

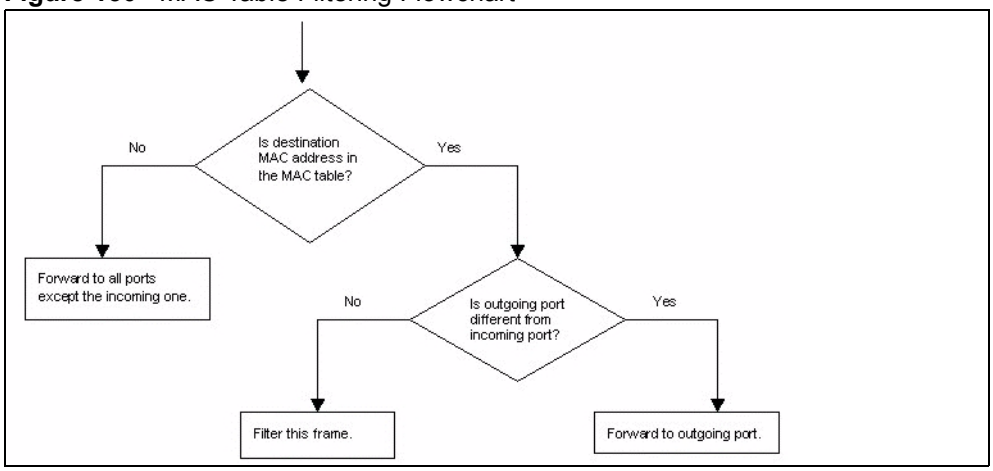
13.4 MAC Table

The MAC table lists device MAC addresses that are dynamically learned by the system. The table shows the following for each MAC address: the port upon which Ethernet frames were received from the device, to which VLAN groups the device belongs (if any) and to which channel it is connected (for devices connected to DSL ports).

The switch uses the MAC table to determine how to forward frames. See the following figure.

1. The switch examines a received frame and learns the port on which this source MAC address came.
2. The switch checks to see if the frame's destination MAC address matches a source MAC address already learned in the MAC table.
   - If the switch has already learned the port for this MAC address, then it forwards the frame to that port.
   - If the switch has not already learned the port for this MAC address, then the frame is flooded to all ports. Too much port flooding leads to network congestion.
   - If the switch has already learned the port for this MAC address, but the destination port is the same as the port it came in on, then it filters the frame.

Figure 130 MAC Table Filtering Flowchart



13.5 MAC Table Screen

Click **Statistics > MAC Table** in the navigation panel to display the following screen. This screen lists device MAC addresses that the system dynamically learned.

Figure 131 MAC Table

MAC Table

Date 2006/10/18
Time 14:23:27

Flush | All | Vid | Slot/Port all | Refresh

Index	Vid	MAC Address	Slot	Port
1	1	00:00:e2:82:7d:90	9	enet6
2	1	00:02:44:84:02:4d	9	enet6
3	1	00:04:80:9b:78:00	9	enet6
4	1	00:07:40:ca:35:a8	9	enet6
5	1	00:0d:9d:9b:61:b1	9	enet6
6	1	00:0e:7f:a8:90:13	9	enet6
7	1	00:0f:fe:09:c5:f8	9	enet6
8	1	00:0f:fe:09:c9:94	9	enet6
9	1	00:0f:fe:1e:4a:f7	9	enet6
10	1	00:13:49:6d:bc:a1	9	enet6
11	1	00:16:17:3a:e2:8c	9	enet6
12	1	00:a0:c5:01:24:02	9	enet6
13	1	00:a0:c5:25:34:77	9	enet6
14	1	00:a0:c5:b2:6a:43	9	enet6
15	1	00:a0:c5:e7:97:fe	9	enet6
16	1	00:c0:9f:96:58:f3	9	enet6

Page 1 of 1 Previous Next

The following table describes the labels in this screen.

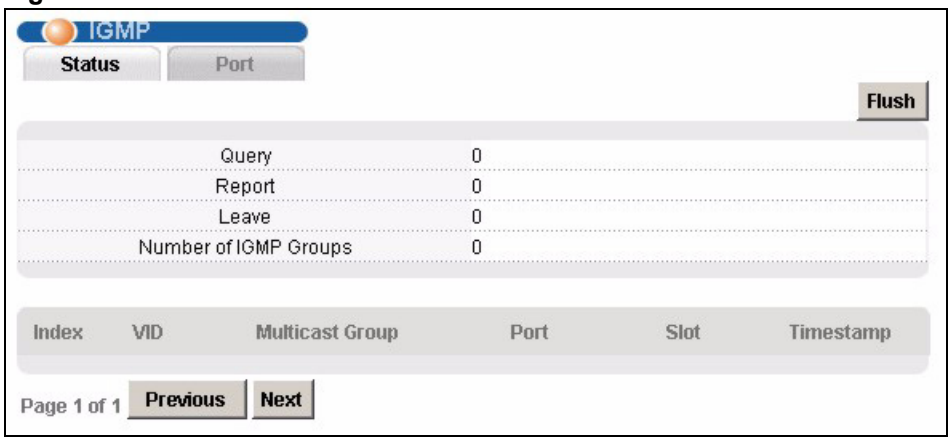
Table 86 MAC Table

LABEL	DESCRIPTION
Date	This displays the date that the displayed MAC address information was last updated. The date is in year, month and day format.
Time	This displays the time that the displayed MAC address information was last updated. The time is in (24-hour) hour, minute and second format.
Flush	Click **Flush** to remove all of the dynamically learned MAC address entries from the MAC table.
All	Select **All** to display the MAC address table of the port/slot belonging to all VLANs.
Vid	Select this open and enter a VLAN ID to display the MAC address table of the port/ slot belonging to this VLAN.
Slot/Port	Select an individual management switch card port or line card for which to show information.
Refresh	Click **Refresh** to update the list of dynamically learned MAC addresses.
Index	This is the number of the MAC table entry.
Vid	This is the VLAN group to which the device belongs.
MAC Address	This is the MAC address of the device that the system has learned is connected to the port.
Slot	This is the number of the slot to which the MAC address is associated.
Port	This is the port to which the MAC address is associated.
Page X of X	This identifies which page of information is displayed and the total number of pages of information.
Previous/Next	Click one of these buttons to show the previous/next screen if all of the information cannot be seen in one screen.

13.6 IGMP Status Screen

Click **Statistics > IGMP Status** in the navigation panel to display the following screen. Use this screen to view information collected by IGMP snooping and/or IGMP proxy.

Figure 132 IGMP Status



The following table describes the labels in this screen.

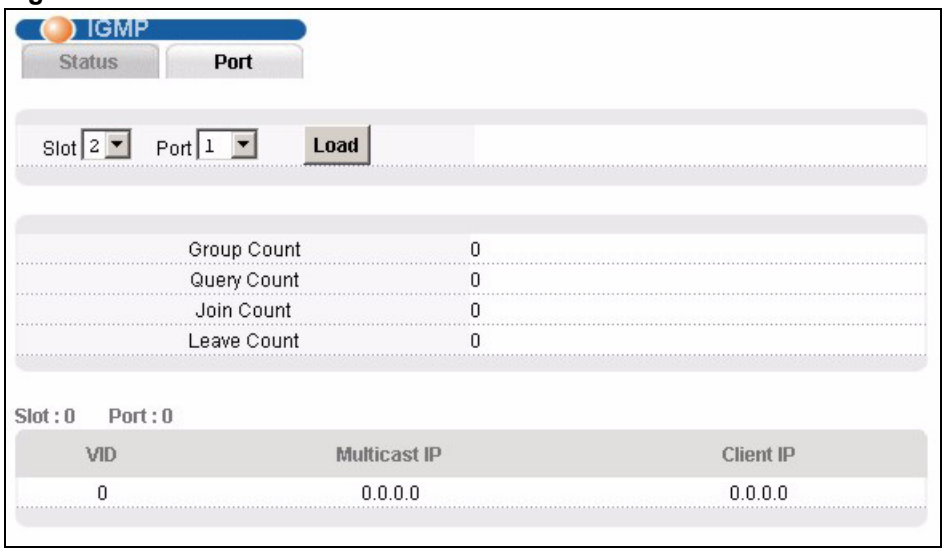
Table 87 IGMP Status

LABEL	DESCRIPTION
Flush	Click **Flush** to reset the counters.
Query	This is the total number of Query packets received.
Report	This is the total number of Report packets received.
Leave	This is the total number of Leave packets received.
Number Of IGMP Groups	This is the number of IGMP groups that the system has identified on the local network.
The first table displays the names of the fields. The subsequent tables show the settings of the IGMP groups.	
Index	This is the IGMP group index number.
VID	The VID is the number that identifies the VLAN that the IP multicast group is on.
Multicast Group	This is the static multicast IP address of an IP multicast group.
Port	This column displays which ports are members of the IGMP group.
Slot	This column displays which slots are members of the IGMP group.
Timestamp	This is the time when the IGMP information was recorded.
Page X of X	This identifies which page of information is displayed and the total number of pages of information.
Previous/Next	Click one of these buttons to show the previous/next screen if all of the information cannot be seen in one screen.

13.6.1 IGMP Port Statistics

Click **Statistics > IGMP Status** > **Port** to display the following screen. Use this screen to view information collected by IGMP snooping and/or IGMP proxy on a selected port.

Figure 133 IGMP Status: Port



The following table describes the labels in this screen.

Table 88 IGMP Status: Port

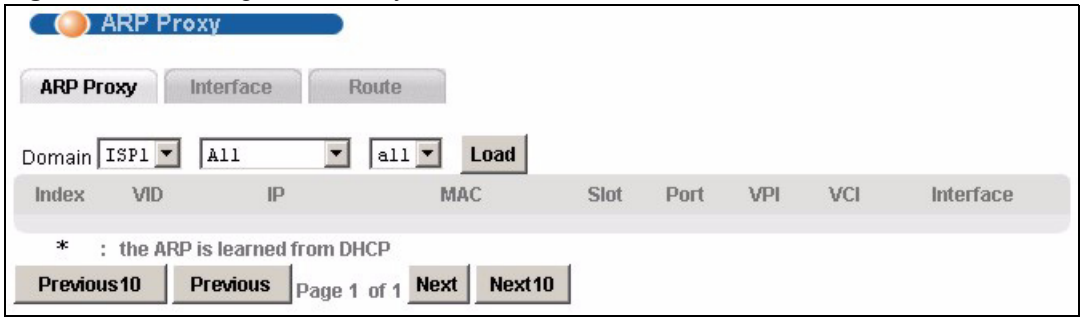
LABEL	DESCRIPTION
Slot/Port	Select a line card and line card port and click **Load** to show information.
Group Count	This is the number of IGMP groups that the port is a member of.
Query Count	This is the total number of Query packets received.
Join Count	This is the total number of Join packets received.
Leave Count	This is the total number of Leave packets received.
The first table displays the names of the fields. The subsequent tables show the settings of the IGMP groups.	
Port	This field displays the selected port number.
Slot	This field displays the selected slot number.
VID	The VID is the number that identifies the VLAN that the IP multicast group is on.
Multicast IP	This is the static multicast IP address of an IP multicast group.
Client IP	This column displays which ports are members of the IGMP group.

13.7 IP Bridge ARP Proxy Screen

Use this screen to look at the Address Resolution Protocol (ARP) table for each IP bridge domain.

To open this screen, click **Statistics > IP Bridge > ARP Proxy**.

Figure 134 IP Bridge ARP Proxy



The following table describes the labels in this screen.

Table 89 IP Bridge ARP Proxy

LABEL	DESCRIPTION
Domain, Load	Select the domain at whose ARP table you want to look. You can also look at the ARP table entries for a specific type of interface or a specific interface in the domain. Click **Load** to display the requested entries below.
Index	This field displays the number of the IP address entry.
VID	This field displays the ID of the VLAN to which the device belongs.
IP	This field displays the IP address assigned to the specific device.
MAC	This field displays the MAC (Media Access Control) address of the device.

Table 89 IP Bridge ARP Proxy (continued)

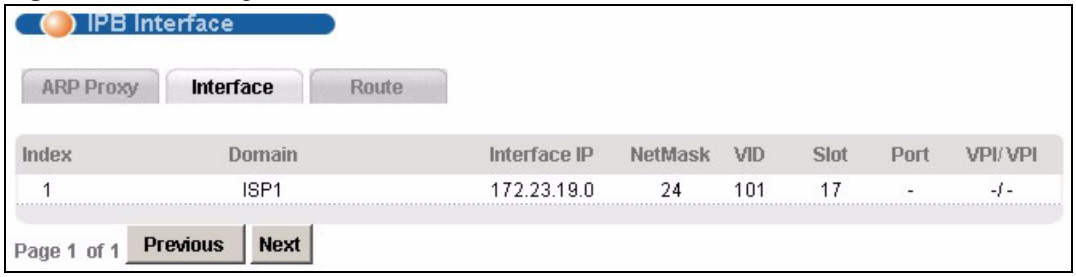
LABEL	DESCRIPTION
Slot	This field displays the number of the slot that contains the line card with the port number to which the device is connected.
Port	This field displays the line card's port number to which the device is connected.
VPI	This field displays the Virtual Path Identifier (VPI) the device is using. The VPI and VCI identify a channel on a port.
VCI	This field displays the Virtual Circuit Identifier (VCI) the device is using. The VPI and VCI identify a channel on a port.
Interface	This field displays the name of the interface the device is using.
Previous 10	Click **Previous 10** to show the preceding 10 pages of information.
Previous	Click **Previous** to show the preceding screen if the information cannot be displayed in one screen.
Page X of X	This identifies which page of information is displayed and the total number of pages of information.
Next	Click **Next** to show the following screen if the information cannot be displayed in one screen.
Next 10	Click **Next 10** to show the following 10 pages of alarms.

13.8 IP Bridge Interfaces Screen

Use this screen to look at all the forwarding information for downstream traffic, whether learned by snooping DHCP packets or provided manually.

To open this screen, click **Statistics > IP Bridge > Interface**.

Figure 135 IP Bridge Interfaces



The following table describes the labels in this screen.

Table 90 IP Bridge Interfaces

LABEL	DESCRIPTION
Index	This field displays the index number of the downlink interface.
Domain	This field displays the name of the domain to which this entry applies.
Interface IP, NetMask	These fields display the IP address and the number of bits in the subnet mask that define the range of IP addresses to which this downlink interface applies. If the destination IP address of a packet is in this range, the MSC1000G tries to forward the frame to a subscriber in the specified VLAN and PVC, if any.
VID	This field displays the VLAN ID the subscriber is in.
Slot	This field displays the number of the slot that contains the line card with the port number to which the MSC1000G forwards frames.

Table 90 IP Bridge Interfaces (continued)

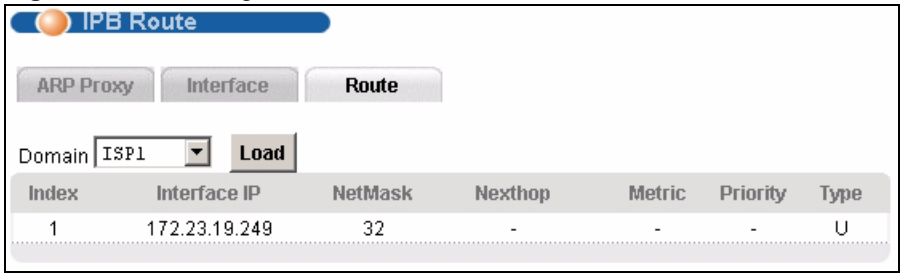
LABEL	DESCRIPTION
Port	This field displays the line card's port number to which the device is connected. It displays "**-**" if the MSC1000G looks for the subscriber in the whole VLAN and not a specific PVC.
VPI/VCI	This field displays the Virtual Path Identifier (VPI) and Virtual Circuit Identifier (VCI), if any. The VPI and VCI identify a channel on this port.
Type	This field specifies whether the downlink interface is running on Ethernet (**ipoe**) or on ATM (**ipoa**).

13.9 IP Bridge Routes Screen

Use this screen to look at the routing table for a domain. This table includes all the entries, whether added automatically by the MSC1000G or provided manually.

To open this screen, click **Statistics > IP Bridge > Route**.

Figure 136 IP Bridge Routes



The following table describes the labels in this screen.

Table 91 IP Bridge Routes

LABEL	DESCRIPTION
Domain	Select a domain for which you wish to view information and click **Load** to display it.
Index	This field displays the number of the entry.
Domain Name	This field displays the name of the domain to which this entry applies.
Interface IP NetMask	These fields display the IP address and the number of bits in the subnet mask that define the range of IP addresses to which this entry applies. If the destination IP address of a packet is in this range, the MSC1000G forwards the frame to the specified edge router.
Nexthop	This field displays the IP address to which the MSC1000G forwards frames if the destination IP address of a packet is in the specified range. It displays "**-**" if the field does not apply to the entry (for example, in entries created automatically by the MSC1000G).
Metric	This field displays the "cost" of transmission for routing purposes. It displays "**-**" if the field does not apply to the entry (for example, in entries created automatically by the MSC1000G).

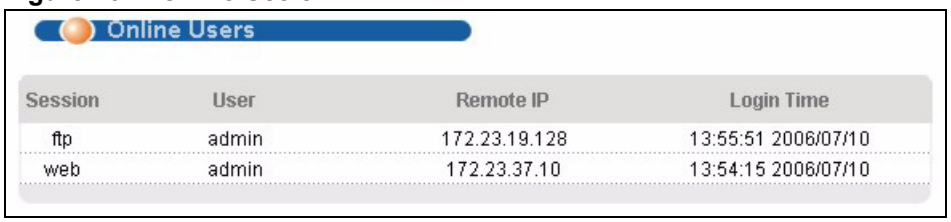
Table 91 IP Bridge Routes (continued)

LABEL	DESCRIPTION
Priority	This field displays the priority value (0 to 7) to add to incoming frames without a (IEEE 802.1p) priority tag. It displays "-" if the field does not apply to the entry (for example, in entries created automatically by the MSC1000G).
Type	This field indicates whether this entry is used for upstream traffic (**U**) or downstream traffic (**D**). By default, all entries are for downstream traffic, unless the edge router is configured in the edge router screen (see Section 11.17 on page 193).

13.10 Online Users Screen

Click **Statistics** > **Online Users** in the navigation panel to display the following screen. Use this screen to view information about administrators that are logged into the system.

Figure 137 Online Users



The following table describes the labels in this screen.

Table 92 Online Users

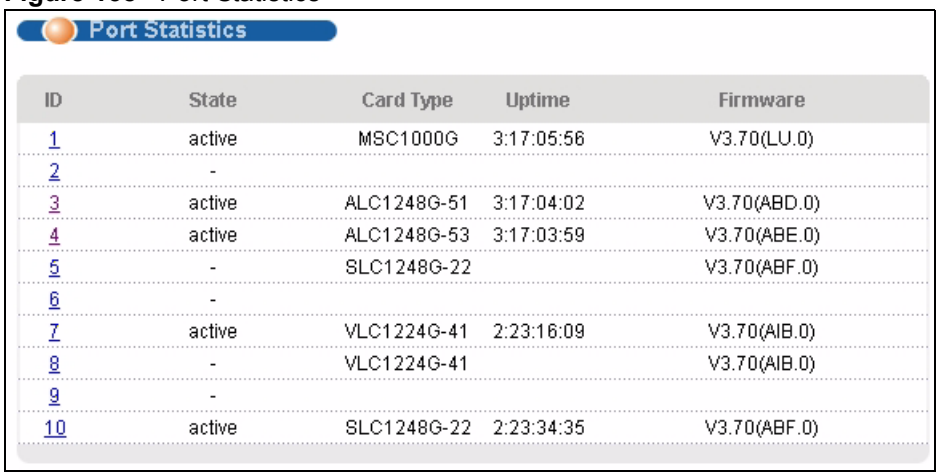
LABEL	DESCRIPTION
Session	This is the type of connection that the administrator is using (web, console, or telnet).
User	This is the user name that the administrator is using.
Remote IP	This is the IP address of the administrator's computer.
Login Time	This displays the time and date that the administrator logged into the system. The time is in (24-hour) hour, minute and second format. The date is in year, month and day format.

13.11 Port Statistics

Click **Statistics** > **Port Statistics** in the navigation panel to display the following screen. Use this screen to view port information (such as packet counts, uptime etc.).

You can only view port information on an active card.

Figure 138 Port Statistics



The following table describes the labels in this screen.

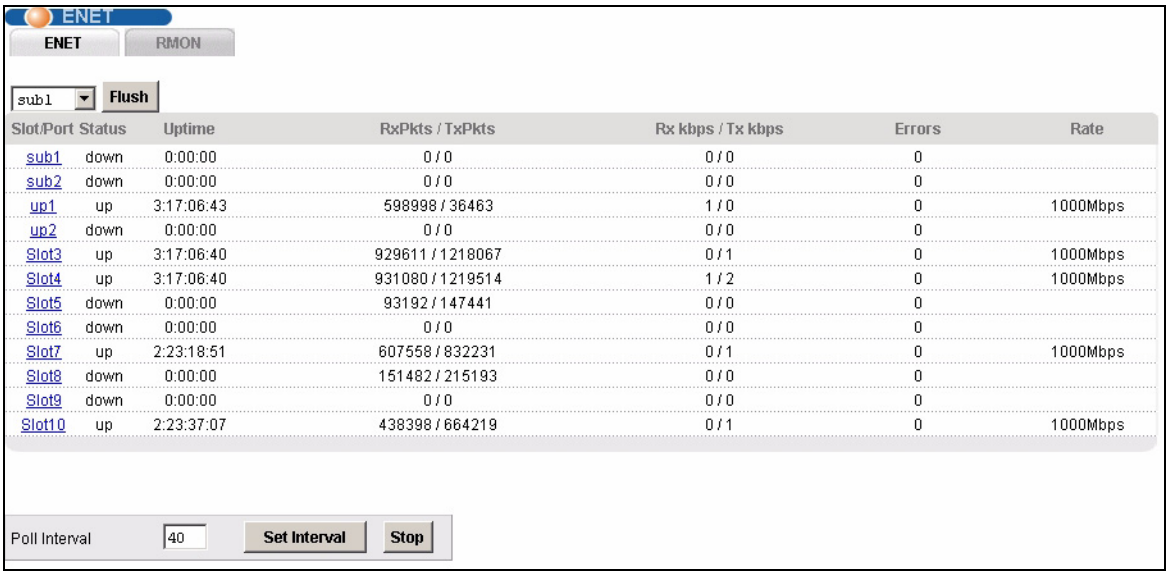
Table 93 Port Statistics

LABEL	DESCRIPTION
ID	This column lists the slot numbers of the cards. Click the ID number of an active card to go to a screen where you can view port status and statistics.
State	This field displays the line card's current operational status. **active** means the line card is operating normally. **init** means the MSC1000G is initializing the line card. **disable** means a manager has disabled the line card. **inactive** means the line card is starting up or is not operating normally. This could be due to the card starting, a firmware upgrade in progress or a malfunction. See Section 34.6 on page 598 for what to do if the line card stays stuck in the inactive state.
Card Type	This field displays the type of a card.
Uptime	This field displays how long the card has been running since the last time it was started.
Firmware	This field displays the current firmware version installed on the card.

13.11.1 Ethernet Port Statistics

Click the ID for an MSC1000G card in the **Port Statistics** screen to view Ethernet port status and statistics.

Figure 139 Port Statistics: ENET



The following table describes the labels in this screen.

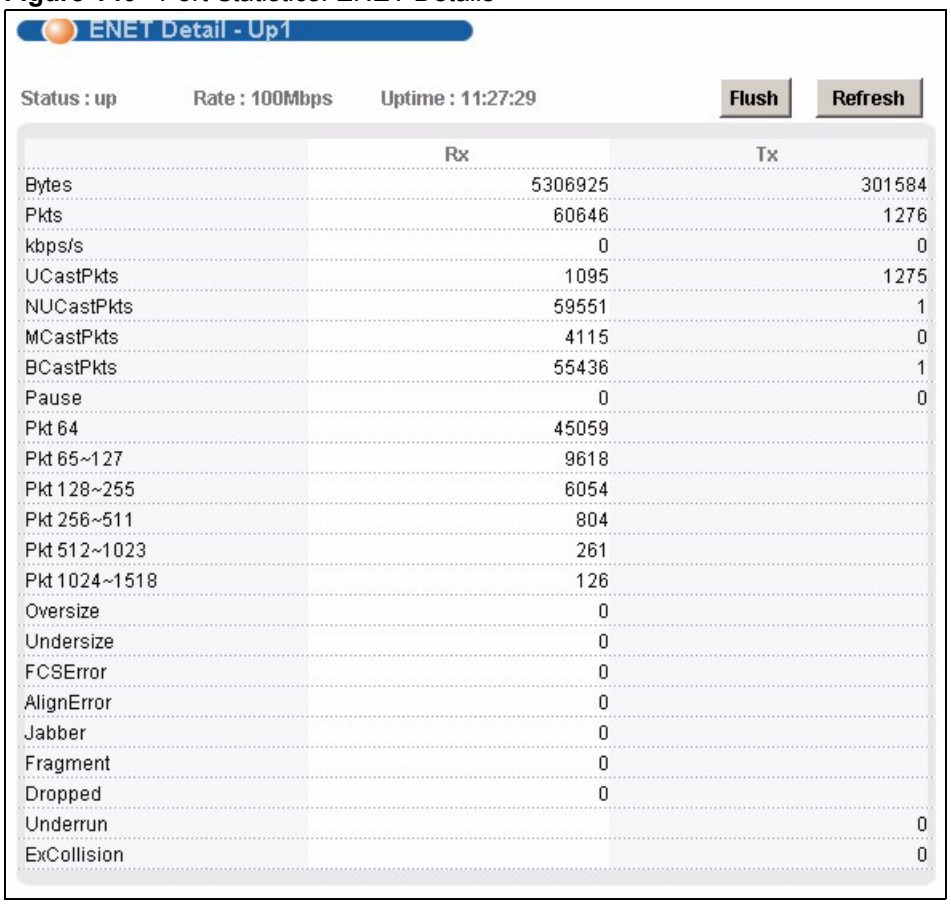
Table 94 Port Statistics: ENET

LABEL	DESCRIPTION
Flush	Select a port or slot and click **Flush** to reset its counters.
Slot/Port	This field displays the port name or slot number. “sub” and “up” refer to the subtending and uplink Ethernet ports on the front panel of the MSC1000G card. “Slot” refers to a back panel Ethernet connection to one of the other cards. Click one of these links to see detailed Ethernet port statistics.
Status	This field displays whether the port is connected (**up**) or not (**down**).
Uptime	This field displays how long the port has been running (or connected) since the last time it was started.
RxPkts/ TxPkts	This field displays the number of packets received/transmitted on this port (including multicast, unicast, broadcast and bad packets).
Rx Kbps/ Tx Kbps	This field displays the number of octets of Ethernet frames received/transmitted per second counting the ones in bad packets, not counting framing bits but counting FCS (Frame Check Sequence) octets. An octet is an 8-bit binary digit (byte).
Errors	This field displays the number of error packets occurred on this port.
Rate	This field displays the transmission speed of the port.
Poll Interval(s)	The text box displays how often (in seconds) this screen refreshes. You may change the refresh interval by typing a new number in the text box and then clicking **Set Interval**.
Stop	Click **Stop** to stop port statistic polling.

13.11.2 Detailed Ethernet Port Statistics

To view detailed port statistics on a selected Ethernet port, click the port index number in the ENET screen.

Figure 140 Port Statistics: ENET Details



	Rx	Tx
Bytes	5306925	301584
Pkts	60646	1276
kbps/s	0	0
UCastPkts	1095	1275
NUCastPkts	59551	1
MCastPkts	4115	0
BCastPkts	55436	1
Pause	0	0
Pkt 64	45059	
Pkt 65~127	9618	
Pkt 128~255	6054	
Pkt 256~511	804	
Pkt 512~1023	261	
Pkt 1024~1518	126	
Oversize	0	
Undersize	0	
FCSError	0	
AlignError	0	
Jabber	0	
Fragment	0	
Dropped	0	
Underrun		0
ExCollision		0

The following table describes labels in this example.

Table 95 Port Statistics: ENET Details

LABEL	DESCRIPTION
Status	This shows whether or not the port has an active connection.
Rate	This shows the connection speed for an active connection.
Uptime	This shows how long the connection has been active.
Flush	Click **Flush** to clear the counters.
Refresh	Click **Refresh** to update this screen.
Bytes	This is the number of octets of Ethernet frames received/transmitted that are from 0 to 1518 octets in size, counting the ones in bad packets, not counting framing bits but counting FCS (Frame Check Sequence) octets. An octet is an 8-bit binary digit (byte).
Pkts	This is the number of packets received/transmitted on this port (including multicast, unicast, broadcast and bad packets).
kbytes/s	This is the number of octets of Ethernet frames received/transmitted per second.
UcastPkts	This is the number of good unicast frames received/transmitted.
NUcastPkts	This is the number of good non-unicast frames received/transmitted.
MCastPkts	This is the number of good multicast frames received/transmitted of 64 to 1518 octets in length (for non VLAN) or 1522 octets (for VLAN), not including Broadcast frames. Frames with range or length errors are also not taken into account.

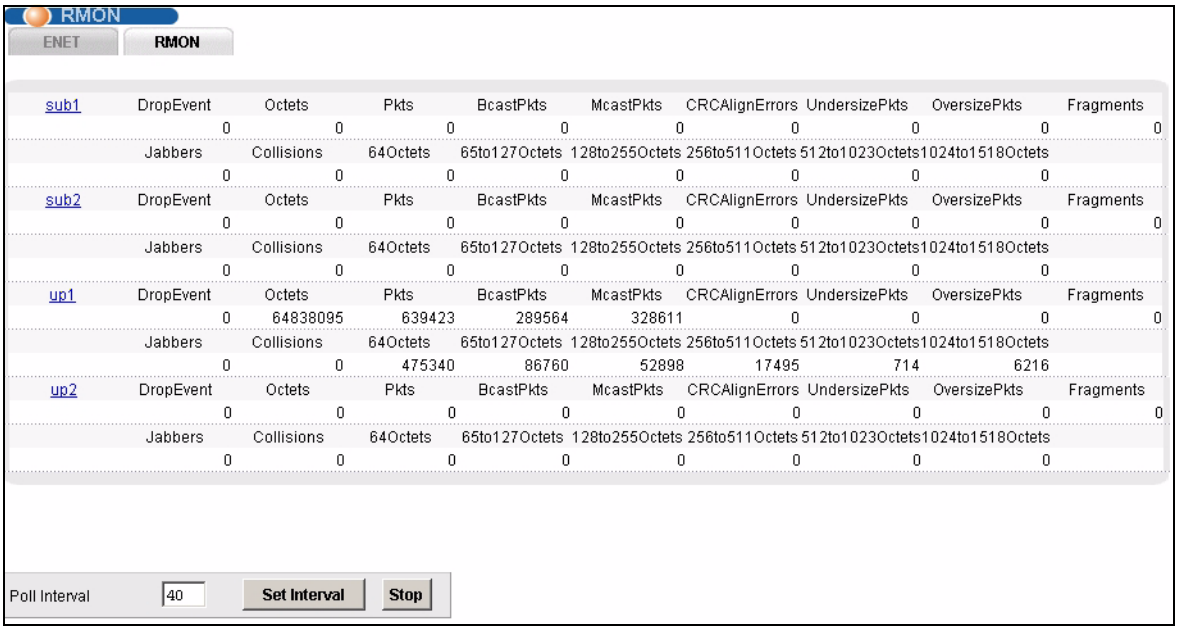
Table 95 Port Statistics: ENET Details (continued)

LABEL	DESCRIPTION
BCastPkts	This is the number of good broadcast frames received/transmitted of 64 to 1518 octets in length (for non VLAN) or 1522 octets (for VLAN), not including multicast frames. Frames with range or length errors are also not taken into account.
Pause	This is the number of valid IEEE 802.3x Pause frames received/transmitted on this port.
Pkt64	This is the number of frames received/transmitted (including bad frames) that were 64 octets or less in length (this includes FCS octets but excludes framing bits).
Pkt65~127	This is the number of frames received/transmitted (including bad frames) that were 65 to 127 octets in length (this includes FCS octets but excludes framing bits).
Pkt128~255	This is the number of frames received and transmitted (including bad frames) that were 128 to 255 octets in length (this includes FCS octets but excludes framing bits).
Pkt256~511	This is the number of frames received/transmitted (including bad frames) that were 256 to 511 octets in length (this includes FCS octets but excludes framing bits).
Pkt512~1023	This is the number of frames received/transmitted (including bad frames) that were 512 to 1023 octets in length (this includes FCS octets but excludes framing bits).
Pkt1024~1518	This is the number of frames received/transmitted (including bad frames) that were 1024 to 1518 octets in length (this includes FCS octets but excludes framing bits).
Oversize	This is the number of frames received/transmitted that were bigger than 1518 (non VLAN) or 1522 (VLAN) octets and contained a valid FCS.
Undersize	This is the number of frames received/transmitted that were less than 64 octets long and contained a valid FCS.
FCSError	This is the number of frames received/transmitted with an integral length of 64 to 1518 octets and containing a Frame Check Sequence error.
AlignError	This is the number of frames received/transmitted that were 64 to 1518 (non VLAN) or 1522 (VLAN) octets long but contained an invalid FCS and a non-integral number of octets.
Jabber	This is the number of frames received/transmitted that were longer than 1518 octets (non VLAN) or 1522 octets (VLAN) and contained an invalid FCS, including alignment errors.
Fragment	This is the number of frames received/transmitted that were less than 64 octets long, and contained an invalid FCS, including non-integral and integral lengths.
Dropped	This is the number of received/transmitted frames that were received by the MSC1000G, but later dropped because of a lack of system resources.
Underrun	This is the number of outgoing frames that were less than 64 octets long.
Collision	This is the number of frames for which transmission failed due to excessive collisions. Excessive collision is defined as the number of maximum collisions before the retransmission count is reset.

13.11.3 RMON Statistics

To view RMON statistics on a switch port, click on the ID for the MSC1000G card in the **Port Statistics** screen and click the **RMON** tab.

Figure 141 Port Statistics: ENET: RMON


RMON
ENET
RMON
sub1 DropEvent Octets Pkts BcastPkts McastPkts CRCAlignErrors UndersizePkts OversizePkts Fragments
0 0 0 0 0 0 0 0 0
Jabbers Collisions 64Octets 65to127Octets 128to255Octets 256to511Octets 512to1023Octets 1024to1518Octets
0 0 0 0 0 0 0 0
sub2 DropEvent Octets Pkts BcastPkts McastPkts CRCAlignErrors UndersizePkts OversizePkts Fragments
0 0 0 0 0 0 0 0 0
Jabbers Collisions 64Octets 65to127Octets 128to255Octets 256to511Octets 512to1023Octets 1024to1518Octets
0 0 0 0 0 0 0 0
up1 DropEvent Octets Pkts BcastPkts McastPkts CRCAlignErrors UndersizePkts OversizePkts Fragments
0 64838095 639423 289564 328611 0 0 0 0
Jabbers Collisions 64Octets 65to127Octets 128to255Octets 256to511Octets 512to1023Octets 1024to1518Octets
0 0 475340 86760 52898 17495 714 6216
up2 DropEvent Octets Pkts BcastPkts McastPkts CRCAlignErrors UndersizePkts OversizePkts Fragments
0 0 0 0 0 0 0 0 0
Jabbers Collisions 64Octets 65to127Octets 128to255Octets 256to511Octets 512to1023Octets 1024to1518Octets
0 0 0 0 0 0 0 0
Poll Interval 40 Set Interval Stop

The following table describes the labels in this screen.

Table 96 Port Statistics: ENET: RMON

LABEL	DESCRIPTION
sub1~up2	These are the Ethernet ports on the front panel of the MSC1000G card. Click one to view RMON history information for that port.
DropEvent	This field displays the total number of packets that were dropped on this port.
Octets	This field displays the total number of octets received/transmitted on this port.
Pkts	This field displays the total number of good packets received/transmitted on this port.
BcastPkts	This field displays the total number of broadcast packets received/transmitted on this port.
McastPkts	This field displays the total number of multicast packets received/transmitted on this port.
CRCAlignErrors	This field displays the total number of CRC (Cyclical Redundancy Check) alignment errors on this port.
UndersizePkts	This field displays the total number of packets that were too small received/ transmitted on this port.
OversizePkts	This field displays the total number of packets that were too big received/ transmitted on this port.
Fragments	This is the number of frames received/transmitted that were less than 64 octets long, and contained an invalid FCS, including non-integral and integral lengths.
Jabbers	This is the number of frames received/transmitted that were longer than 1518 octets (non VLAN) or 1522 octets (VLAN) and contained an invalid FCS, including alignment errors.
Collisions	This is the number of frames for which transmission failed due to excessive collisions. Excessive collision is defined as the number of maximum collisions before the retransmission count is reset.
64Octets	This is the number of frames received/transmitted (including bad frames) that were 64 octets or less in length (this includes FCS octets but excludes framing bits).

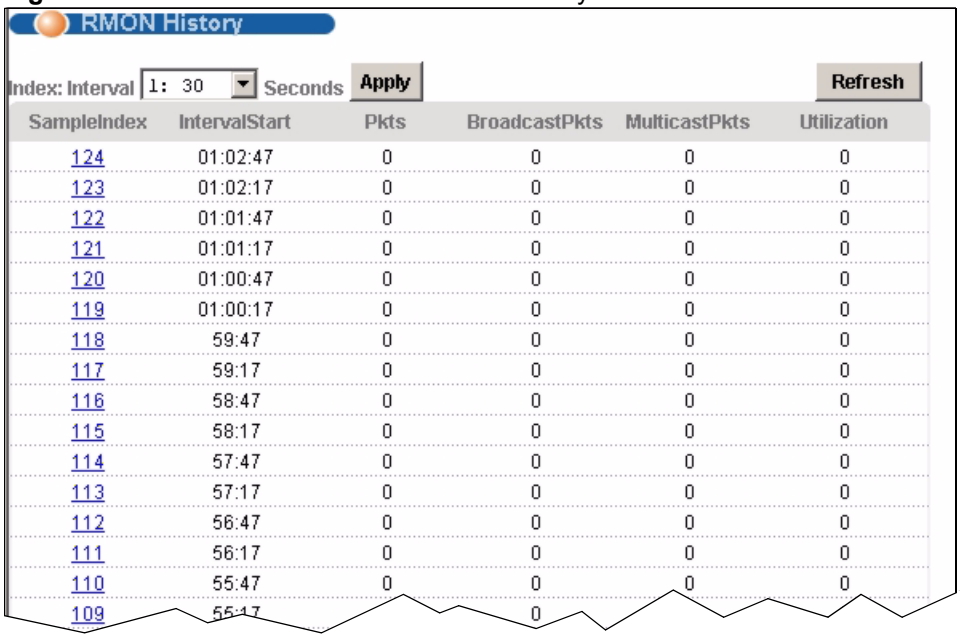
Table 96 Port Statistics: ENET: RMON (continued)

LABEL	DESCRIPTION
65to127Octets	This is the number of frames received/transmitted (including bad frames) that were 65 to 127 octets in length (this includes FCS octets but excludes framing bits).
128to255Octets	This is the number of frames received and transmitted (including bad frames) that were 128 to 255 octets in length (this includes FCS octets but excludes framing bits).
256to511Octets	This is the number of frames received/transmitted (including bad frames) that were 256 to 511 octets in length (this includes FCS octets but excludes framing bits).
512to1023Octets	This is the number of frames received/transmitted (including bad frames) that were 512 to 1023 octets in length (this includes FCS octets but excludes framing bits).
1024to1518Octets	This is the number of frames received/transmitted (including bad frames) that were 1024 to 1518 octets in length (this includes FCS octets but excludes framing bits).
Poll Interval(s)	The text box displays how often (in seconds) this screen refreshes. You may change the refresh interval by typing a new number in the text box and then clicking **Set Interval**.
Stop	Click **Stop** to stop port statistic polling.

13.11.3.1 RMON History Statistics

To view RMON history information, click a switch port link in the **RMON** screen. This RMON History screen displays general information (such as sample time) on history samples.

Figure 142 Port Statistics: ENET: RMON History



The following table describes the labels in this screen.

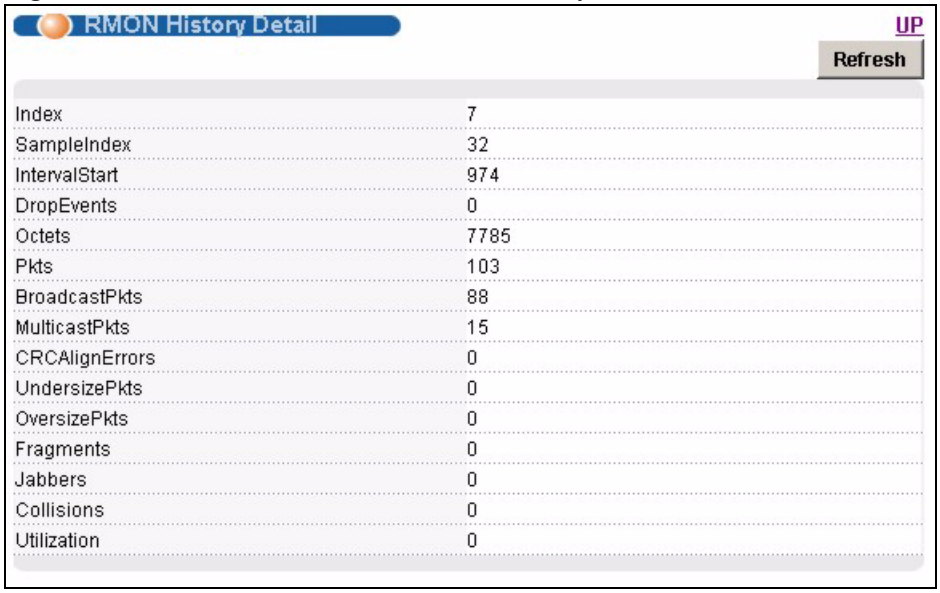
Table 97 Port Statistics: ENET: RMON History

LABEL	DESCRIPTION
Interval	Click **Apply** to use the selected data sampling time.
Refresh	Click **Refresh** to update this screen.
SampleIndex	This field display the index number. Click this link to view detailed RMON history information.
Interval Start	This field displays the data sampling time.
Pkts	This field displays the number of packets received/transmitted since the last sample time.
BroadcastPkts	This field displays the number of broadcast packets received/transmitted since the last sample time.
MulticastPkts	This field displays the number of multicast packets received/transmitted since the last sample time.
Utilization	This field displays the port utilization status.

13.11.3.2 RMON History Details

To view detail RMON history information, click on a sample index in the **RMON History** screen. An **RMON History Detail** screen displays. Refer to Table 96 on page 241 or Table 97 on page 243 for more field descriptions.

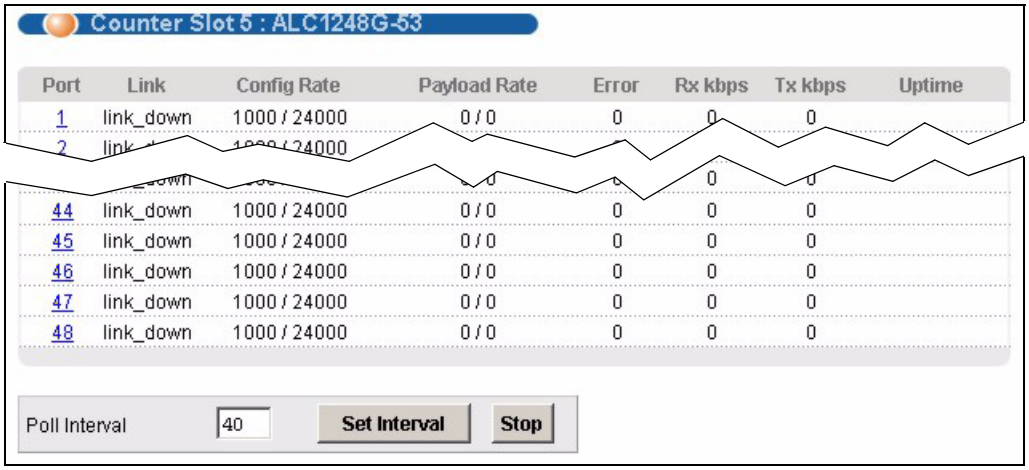
Figure 143 Port Statistics: ENET: RMON History: Detail



13.11.4 Line Card Statistics

Click the ID for a line card in the **Port Statistics** screen to view port status and statistics on the line card. Statistics screens for the line cards are similar. Example screens for the ALC-1248G-53 are shown.

Figure 144 Port Statistics: Line Card


Counter Slot 5 : ALC1248G-53
Port
Link
Config Rate
Payload Rate
Error
Rx kbps
Tx kbps
Uptime
1 link_down 1000 / 24000 0 / 0 0 0 0
44 link_down 1000 / 24000 0 / 0 0 0 0
45 link_down 1000 / 24000 0 / 0 0 0 0
46 link_down 1000 / 24000 0 / 0 0 0 0
47 link_down 1000 / 24000 0 / 0 0 0 0
48 link_down 1000 / 24000 0 / 0 0 0 0
Poll Interval
40
Set Interval
Stop

The following table describes the labels in this screen.

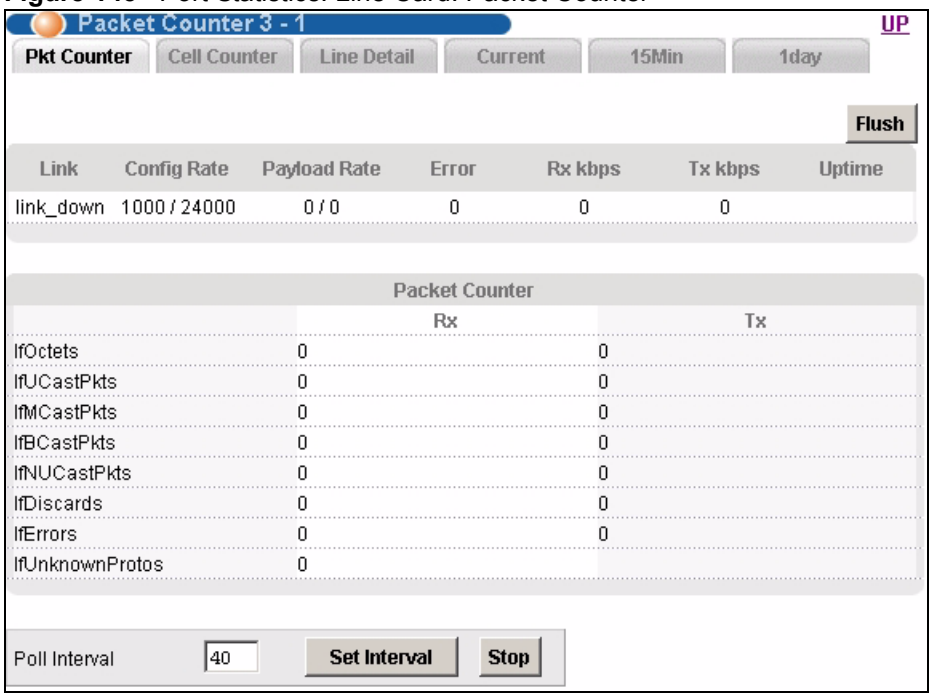
Table 98 Port Statistics: Line Card

LABEL	DESCRIPTION
Port	This field displays the port number.
Link	This field displays the port link status. On an SHDSL port, this field displays the wire pair setting when the port is up.
Config Rate	This field displays the configured upstream and downstream rates.
Payload Rate	This field displays the actual upstream and downstream rates.
Error	This field displays the number of errors occurred on the port.
Rx kbps	This field displays the receiving rate in kilo bits per second (kbps).
Tx kbps	This field displays the transmission rate in kilo bits per second (kbps).
Uptime	This field displays how long the connection is up.
Poll Interval(s)	The text box displays how often (in seconds) this screen refreshes. You may change the refresh interval by typing a new number in the text box and then clicking **Set Interval**.
Stop	Click **Stop** to stop port statistic polling.

13.11.4.1 Packet Counter

To display the packet counters of a port on a line card, click the port number in the line card's statistics screen (see Figure 144 on page 244).

Figure 145 Port Statistics: Line Card: Packet Counter



The following table describes the labels in this screen.

Table 99 Port Statistics: Line Card: Packet Counter

LABEL	DESCRIPTION
Flush	Click **Flush** to clear the counters.
Link	This field displays the port link status.
Payload Rate	This field displays the configured and actual upstream and downstream rates.
Error	This field displays the number of errors occurred on the port.
Rx kbps	This field displays the receiving rate in kilo bits per second (kbps).
Tx kbps	This field displays the transmission rate in kilo bits per second (kbps).
Uptime	This field displays how long the port has been running since the last time it was started.
Packet Counter	
IfOctets	This field displays the number of octets received/transmitted on this port.
IfUCastPkts	This field displays the number of unicast packets received/transmitted on this port.
IfBCastPkts	This field displays the number of broadcast packets received/transmitted on this port.
IfMCastPkts	This field displays the number of multicast packets received/transmitted on this port.
IfDiscard	This field displays the number of received/transmitted packets that were discarded on this port.
IfErrors	This field displays the number of packets received/transmitted with errors on this port.
IfUnknownProtos	This field displays the number of packets received/transmitted with unknown protocol number on this port.

Table 99 Port Statistics: Line Card: Packet Counter (continued)

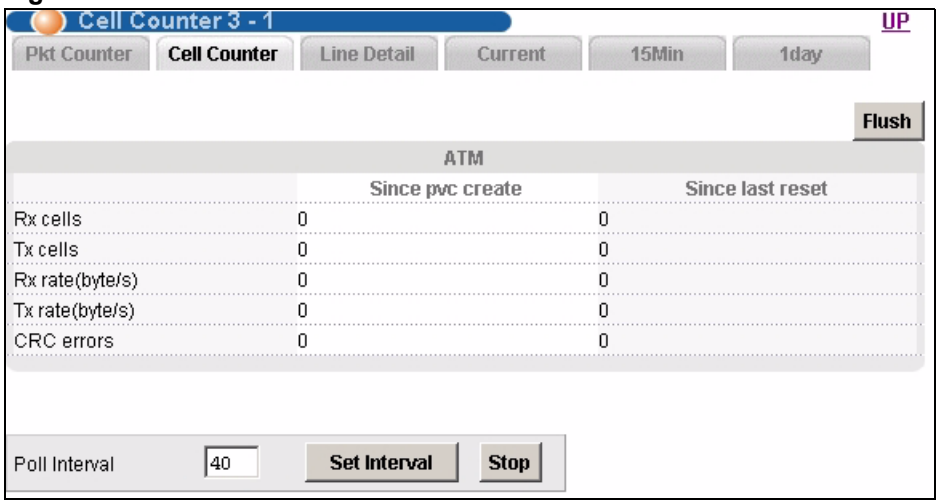
LABEL	DESCRIPTION
Poll Interval(s)	The text box displays how often (in seconds) this screen refreshes. You may change the refresh interval by typing a new number in the text box and then clicking **Set Interval**.
Stop	Click **Stop** to stop port statistic polling.

13.11.4.2 Cell Counters

To display detailed ATM cell count information, click the port number in the line card's statistics screen (see Figure 144 on page 244) and click the **Cell Counter** tab.

The **Cell Counter** screen is NOT available for the VLC.

Figure 146 Port Statistics: Line Card: Cell Counter



The following table describes the labels in this screen.

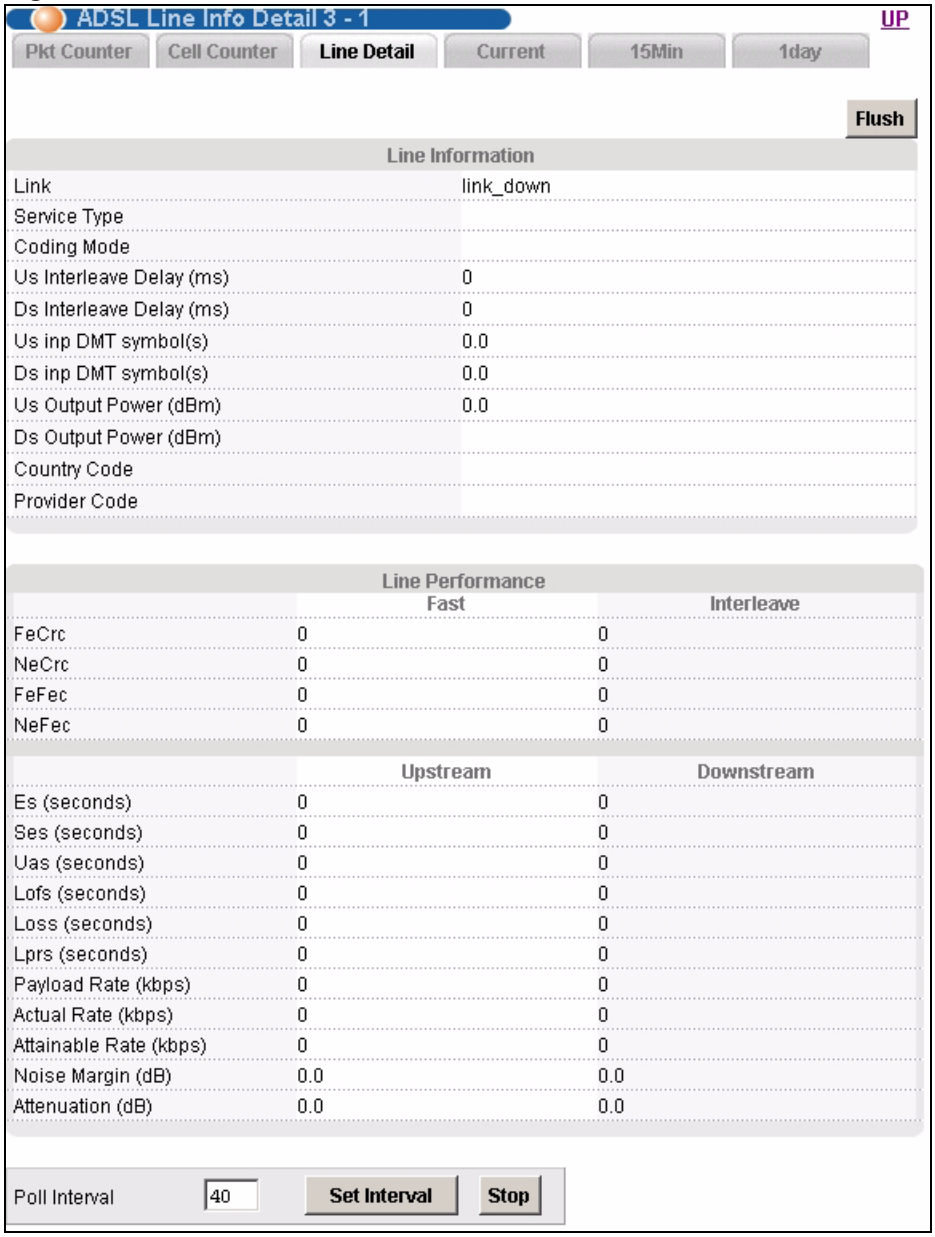
Table 100 Port Statistics: Line Card: Cell Counter

LABEL	DESCRIPTION
Flush	Click **Flush** to clear the counters.
ATM	
Rx cells	This field displays the number of cells received.
Tx Cells	This field displays the number of cells transmitted.
Rx rate (byte/sec)	This field displays the number of cells bytes received per second.
Tx rate (byte/sec)	This field displays the number of cells bytes transmitted per second.
CRC errors	This field displays the number of CRC errors.
Poll Interval(s)	The text box displays how often (in seconds) this screen refreshes. You may change the refresh interval by typing a new number in the text box and then clicking **Set Interval**.
Stop	Click **Stop** to stop port statistic polling.

13.11.4.3 Line Detail

To display detailed line information, click the port number in the line card's statistics screen (see Figure 144 on page 244) and click the **Line Detail** tab.

Figure 147 Port Statistics: Line Card: Line Detail



The following table describes the labels in this screen.

Table 101 Port Statistics: Line Card: Line Detail

LABEL	DESCRIPTION
Flush	Click **Flush** to clear the counters.
Line Information	
Link	This displays the connection status of the DSL link.
Service Type	This is the DSL standard that the port is using.

Table 101 Port Statistics: Line Card: Line Detail (continued)

LABEL	DESCRIPTION
Coding Mode	Trellis coding helps to reduce the noise in ADSL transmissions. Trellis may reduce throughput but it makes the connection more stable. "RS" coding stands for Reed-Solomon error correction.
Us Interleave Delay	This is the number of milliseconds of interleave delay for upstream transmissions.
Ds Interleave Delay	This is the number of milliseconds of interleave delay for downstream transmissions.
Us inp DMT symbol(s)	This is the number of impulse noise protection DMT symbols for upstream transmissions.
Ds inp DMT symbol(s)	This is the number of impulse noise protection DMT symbols for downstream transmissions.
Us Output Power (dBm)	This is the power output of the subscriber's DSL modem or router. The total output power of the transceiver varies with the line length and quality.
Ds Output Power (dBm)	This is the DSP port's output power. The total output power of the transceiver varies with the length and line quality. The farther away the subscriber's ADSL modem or router is or the more interference there is on the line, the higher the power will be.
Country Code	This is the country code acquired from the subscriber's ADSL device during negotiation/provisioning message interchanges. The country code is from the Vendor ID (see ITU-T G.994.1).
Provider Code	This is the provider code acquired from the subscriber's ADSL device during negotiation/provisioning message interchanges. The provider code includes the Vendor ID and Version Number obtained from the Vendor ID.
Min Rate (kbps)	This is the minimum upstream and downstream rates on the SHDSL port.
Config Rate (kbps)	This field displays the configured upstream and downstream rates on the SHDSL port.
Actual Rate (kbps)	This field displays the actual upstream and downstream rates on the SHDSL port.
Noise Margin (dB)	These are the SHDSL line's noise margins. Measured in decibels (dB).
Attenuation (dB)	These are the reductions in amplitude of the SHDSL signals. Measured in decibels (dB).
Linkup Count	This is the number of Linkup attempts on the VDSL port.
VTUC Vendor	This field displays the name of the CO VDSL device vendor.
VTUC Version	This field displays the name of the CO VDSL device hardware version.
VTUC Serial	This field displays the name of the CO VDSL device serial number.
VTUR Vendor	This field displays the name of the CPE VDSL device vendor.
VTUR Version	This field displays the name of the CPE VDSL device hardware version.
VTUR Serial	This field displays the name of the CPE VDSL device serial number.
Line Performance	
FeCrc	This is the number of far end cyclic redundancy checks.
NeCrc	This is the number of near end cyclic redundancy checks.
FeFec	This is the number of far end corrected blocks.
NeFec	The is the number of near end corrected blocks.
Es (seconds)	This is the number of Errored Seconds. This is how many seconds contained at least one errored block or at least one defect.

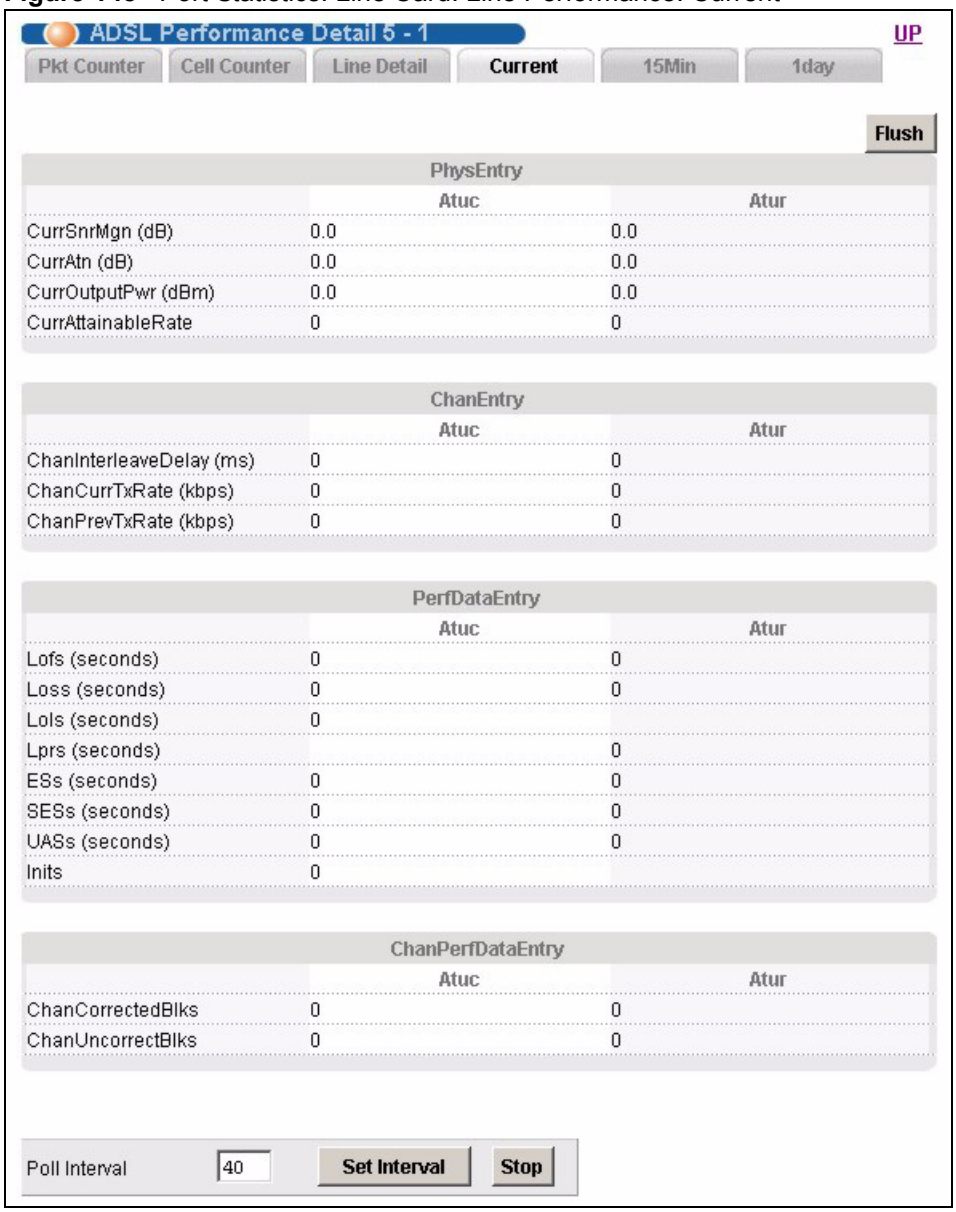
Table 101 Port Statistics: Line Card: Line Detail (continued)

LABEL	DESCRIPTION
Ses (seconds)	This is the number of Severely Errored Seconds. This is how many seconds contained 30% or more errored blocks or at least one defect. This is a subset of Es.
Uas (seconds)	This is the number of Unavailable seconds (Uas).
Lofs (seconds)	This is the number of Loss Of Frame (Lof) seconds.
Loss (seconds)	This is the number of Loss Of Signal (Los) seconds.
Lprs (seconds)	This is the number of times a Loss of PoweR (on the ATUR) has occurred.
CRC	This is the number of Cyclic Redundancy Check (CRC) error seconds.
Losws	This is the number of Lost Sync Word (LOSW) seconds.
Segment Anomaly	This is the number of segment anomaly seconds.
Segment Defect	This is the number of segment defect seconds.
Payload Rate (Kbps)	These are the data (the payload data without transport layer protocol headers and traffic) transfer rates (in Kbps) at which the port is receiving and sending data.
Actual Rate (Kbps)	These are the data transfer rates (in Kbps) at which the port is receiving and sending data.
Attainable Rate (Kbps)	These are the highest theoretically possible transfer rates (in Kbps) at which the port could receive and send data.
Noise Margin (dB)	These are the DSL line's noise margins. Measured in decibels (dB).
Attenuation (dB)	These are the reductions in amplitude of the DSL signals. Measured in decibels (dB).
Poll Interval(s)	The text box displays how often (in seconds) this screen refreshes. You may change the refresh interval by typing a new number in the text box and then clicking **Set Interval**.
Stop	Click **Stop** to stop port statistic polling.

13.11.4.4 Current Line Performance

To display current line performance counters, click the port number in the line card's statistics screen (see Figure 144 on page 244) and click the **Current** tab.

Figure 148 Port Statistics: Line Card: Line Performance: Current



The following table describes the labels in this screen.

Table 102 Port Statistics: Line Card: Line Performance: Current

LABEL	DESCRIPTION
Flush	Click **Flush** to clear the counters.
PhysEntry	
CurrSnrMgn (dB)	These are the DSL line's current downstream and upstream signal to noise margins in decibels.
CurrAtn (dB)	These are the DSL line's current downstream and upstream line attenuation in decibels.
CurrOutputPwr (dBm)	These are the DSL line's current downstream and upstream output powers in decibels.
CurrAttainableRate	These are the DSL line's current downstream and upstream attainable rates in decibels.

Table 102 Port Statistics: Line Card: Line Performance: Current (continued)

LABEL	DESCRIPTION
ChanEntry	
ChanInterleaveDelay (ms)	These are the numbers of milliseconds of interleave delay for downstream and upstream transmissions.
SlowBurstProtect (kbps)	This field displays the level of impulse noise (burst) protection for a slow interleaved channel.
ChanCurrTxRate (kbps)	These are the DSL line's current downstream and upstream transmission rates in decibels.
ChanPrevTxRate (kbps)	These are the DSL line's previous downstream and upstream transmission rates in decibels.
PerfDataEntry	
Lofs (seconds)	These are the DSL line's downstream and upstream numbers of Loss of frame Seconds that have occurred within the current 15 minute period.
Loss (seconds)	These are the DSL line's downstream and upstream numbers of Loss of signal Seconds that have occurred within the current 15 minute period.
Lols (seconds)	These are the DSL line's downstream and upstream numbers of Loss of link Seconds that have occurred within the current 15 minute period.
Lprs (seconds)	These are the DSL line's downstream and upstream numbers of Loss of power Seconds that have occurred within the current 15 minute period.
ESs (seconds)	These are the DSL line's downstream and upstream numbers of Errored Seconds that have occurred within the current 15 minute period.
SESs (seconds)	This is the number of Severely Errored Seconds. This is how many seconds contained 30% or more errored blocks or at least one defect. This is a subset of Es.
UASs (seconds)	This is the number of Unavailable seconds (Uas).
Inits (seconds)	These are the DSL line's downstream and upstream numbers of initialization failure traps that have occurred within the current 15 minute period.
StatSesL (seconds)	These are the DSL line's downstream and upstream numbers of Severely errored seconds that have occurred within the current 15 minute period.
StatUasL (seconds)	These are the DSL line's downstream and upstream numbers of UnAvailable Seconds that have occurred within the current 15 minute period.
ChanPerfDataEntry	
ChanCorrectedBlks	These are the numbers of corrected blocks for downstream and upstream transmissions.
ChanUnCorrectedBlks	These are the numbers of uncorrected blocks for downstream and upstream transmissions.
EndpointCurrEntry	
CurrSnrMgn (dB)	These are the DSL line's current downstream and upstream signal to noise margins in decibels.
CurrAtn (dB)	These are the DSL line's current downstream and upstream line attenuation in decibels.
CRC (seconds)	This field displays the number of CRC anomalies since the system was last restarted
ESs (seconds)	This is the number of Errored Seconds. This is how many seconds contained at least one errored block or at least one defect.
SESs (seconds)	This is the number of Severely Errored Seconds. This is how many seconds contained 30% or more errored blocks or at least one defect. This is a subset of Es.

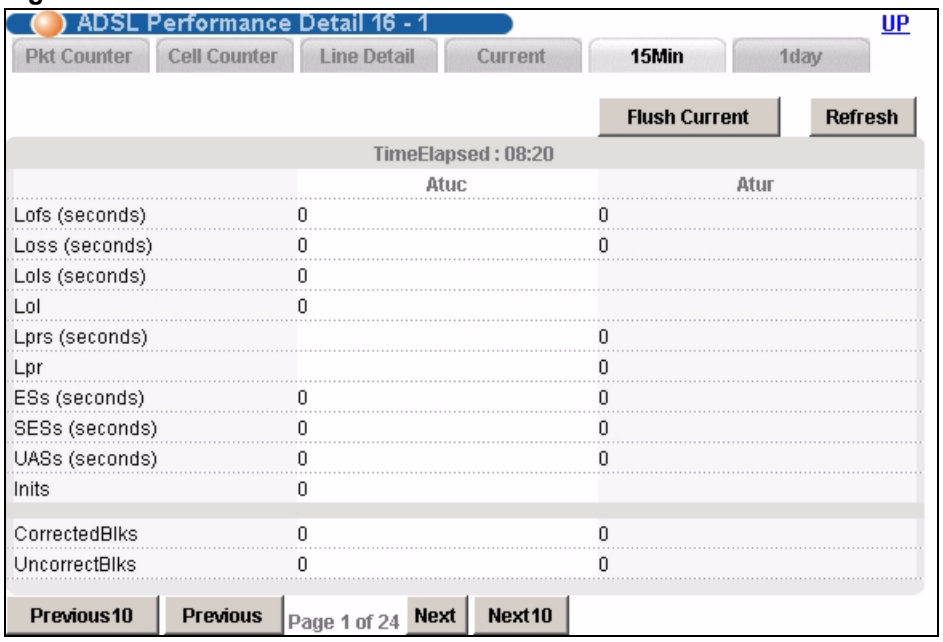
Table 102 Port Statistics: Line Card: Line Performance: Current (continued)

LABEL	DESCRIPTION
LOSWs (seconds)	This is the number of Lost Sync Word (LOSW) seconds.
UASs (seconds)	This is the number of Unavailable seconds (Uas).
Poll Interval(s)	The text box displays how often (in seconds) this screen refreshes. You may change the refresh interval by typing a new number in the text box and then clicking **Set Interval**.
Stop	Click **Stop** to stop port statistic polling.

13.11.4.5 15Min Line Performance

To display line performance counters for the past 15 minutes, click the port number in the line card's statistics screen (see Figure 144 on page 244) and click the **15Min** tab.

Figure 149 Port Statistics: Line Card: Line Performance: 15Min



The following table describes the labels in this screen.

Table 103 Port Statistics: Line Card: Line Performance: 15Min

LABEL	DESCRIPTION
Flush Current	Click **Flush Current** to clear the counters.
Refresh	Click **Refresh** to update this screen.
TimeElapsed	This field displays the time since the last 15-minute data collection.
Lofs (seconds)	These are the DSL line's downstream and upstream numbers of Loss of frame Seconds that have occurred for the past 15 minute period.
Loss (seconds)	These are the DSL line's downstream and upstream numbers of Loss of signal Seconds that have occurred for the past 15 minute period.
Lols (seconds)	This is the DSL line's downstream number of Loss of link Seconds that have occurred for the past 15 minute period.
Lol	This is the number of times the DSL line's downstream connection has experienced a Loss of link during the past 15 minute period.

Table 103 Port Statistics: Line Card: Line Performance: 15Min (continued)

LABEL	DESCRIPTION
Lprs (seconds)	This is the DSL line's upstream number of Loss of power Seconds that have occurred for the past 15 minute period.
Lpr	This is the number of times the DSL line's upstream connection has experienced a Loss of power during the past 15 minute period.
ESs (seconds)	These are the DSL line's downstream and upstream numbers of Errored Seconds that have occurred for the past 15 minute period.
SESs (seconds)	These are the DSL line's downstream and upstream numbers of Severely Errored Seconds that have occurred for the past 15 minute period. This is how many seconds contained 30% or more errored blocks or at least one defect. This is a subset of Es.
UASs	These are the DSL line's downstream and upstream numbers of UnAvailable Seconds that have occurred for the past 15 minute period.
Inits	These are the DSL line's downstream and upstream numbers of initialization failure traps that have occurred for the past 15 minute period.
CorrectedBlks	These are the numbers of corrected blocks for downstream and upstream transmissions.
UnCorrectedBlks	These are the numbers of uncorrected blocks for downstream and upstream transmissions.
Poll Interval(s)	The text box displays how often (in seconds) this screen refreshes. You may change the refresh interval by typing a new number in the text box and then clicking **Set Interval**.
Stop	Click **Stop** to stop port statistic polling.

13.11.4.6 1day Line Performance

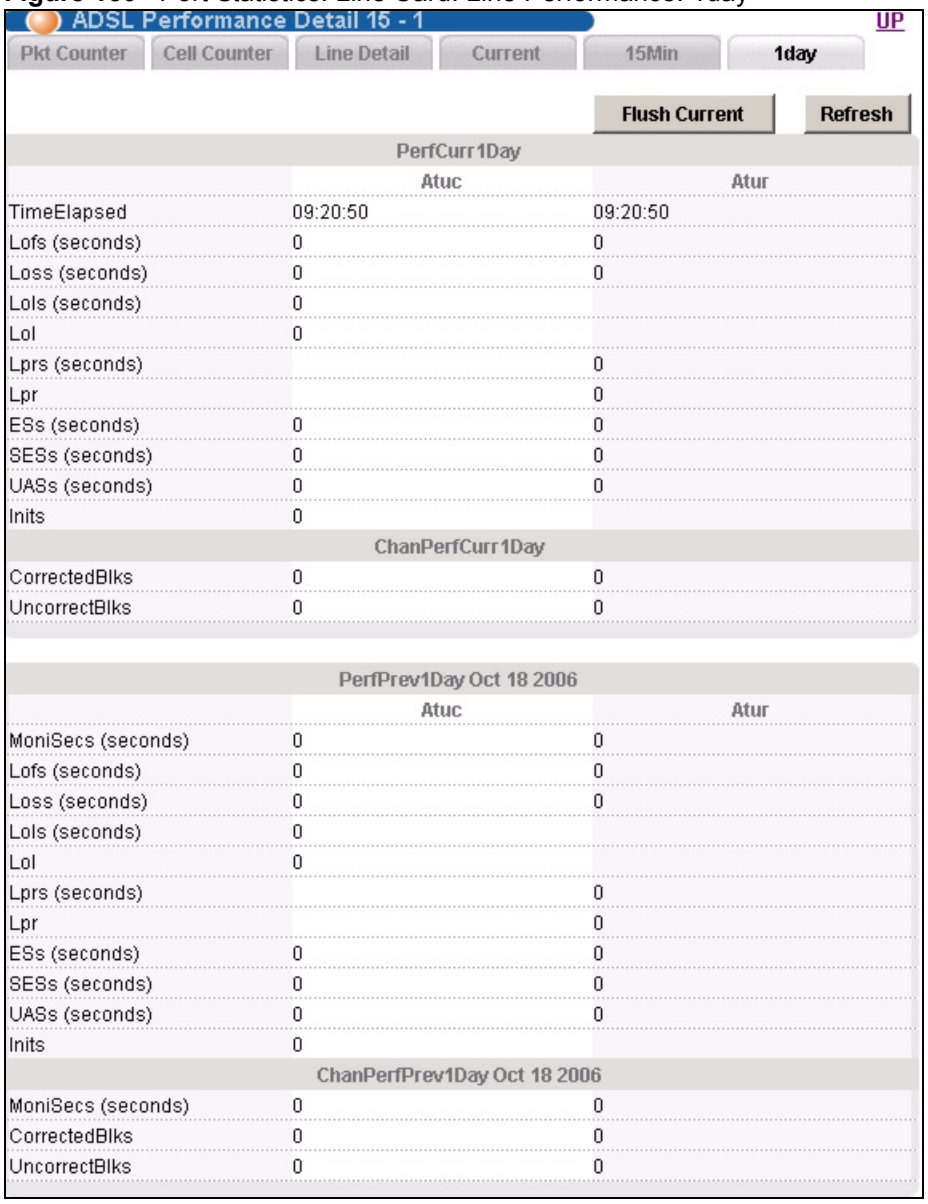
To display line performance counters for the past one day, click the port number in the line card's statistics screen (see Figure 144 on page 244) and click the **1day** tab.

TimeElapsed shows how long the port's downstream and upstream connections have been up during the current day.

MoniSecs (seconds) shows how long the port's downstream and upstream connections have been up during a previous day.

Refer to Table 103 on page 252 for descriptions of the rest of the fields in this screen.

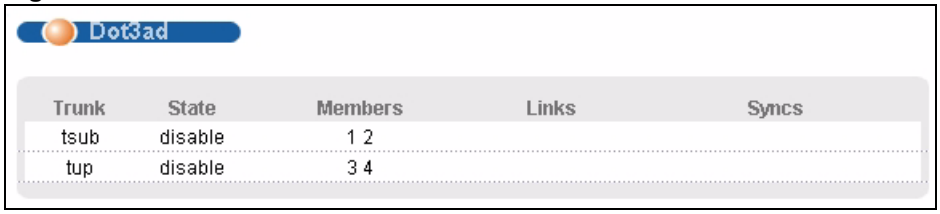
Figure 150 Port Statistics: Line Card: Line Performance: 1day



13.12 Dot3ad

Click **Statistics > Dot3ad** in the navigation panel to display the following screen. Use this screen to view IEEE 802.3ad link aggregation settings.

Figure 151 Dot3ad



The following table describes the labels in this screen.

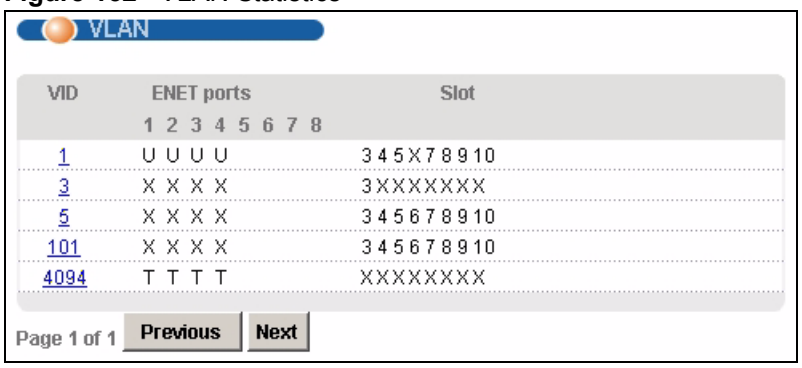
Table 104 Dot3ad

LABEL	DESCRIPTION
Trunk	Sub refers to the subtending ports while up refers to the uplink ports.
State	This field displays whether link aggregation is activated on the ports.
Members	This field displays the name of the link aggregation group.
Links	These are the ports you have configured to be in the trunk group.
Syncs	These are the ports that are currently transmitting data as one logical link in this trunk group.

13.13 VLAN Statistics

Click **Statistics > VLAN** in the navigation panel to display the following screen. Use this screen to view current VLAN settings.

Figure 152 VLAN Statistics


VLAN
VID
ENET ports
1 2 3 4 5 6 7 8
Slot
1 U U U U 3 4 5 X 7 8 9 10
3 X X X X 3 X X X X X X X
5 X X X X 3 4 5 6 7 8 9 10
101 X X X X 3 4 5 6 7 8 9 10
4094 T T T T X X X X X X X X
Page 1 of 1
Previous
Next

The following table describes the labels in this screen.

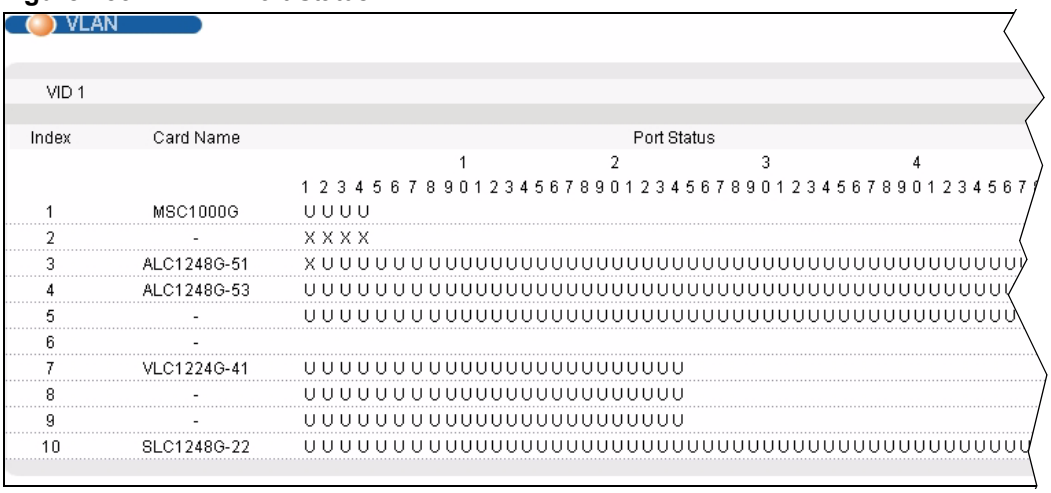
Table 105 VLAN Statistics

LABEL	DESCRIPTION
VID	This field displays the VLAN ID.
ENET ports 1~8	This column displays the VLAN's settings for the MSC1000G's Ethernet ports. ENET port 1 and 2 are subtending ports 1 and 2. ENET port 3 and 4 are uplink ports 1 and 2. ENET ports 5~8 do not apply. A tagged port is marked as **T**, an untagged port is marked as **U** and ports not participating in a VLAN are marked as **X**.
Slot	This column displays the VLAN's settings for the line cards (identified by slot). A number displays for each line card that is a member of the VLAN. An "X" displays for each line card that is not a member of the VLAN.
Page X of X	This identifies which page of information is displayed and the total number of pages of information.
Previous/Next	Click one of these buttons to show the previous/next screen if all of the information cannot be seen in one screen.

13.13.1 VLAN Port Statistics

To view VLAN port status, click a VID in the **VLAN** screen.

Figure 153 VLAN: Port Status



The following table describes the labels in this screen.

Table 106 VLAN: Port Status

LABEL	DESCRIPTION
VID X	This field displays the VLAN ID.
Index	This field displays the index number.
Card Name	This field displays the name of the line card in this VLAN.
Port Status	This field displays the port status in this VLAN. A tagged port is marked as **T**, an untagged port is marked as **U** and ports not participating in a VLAN are marked as **X**.

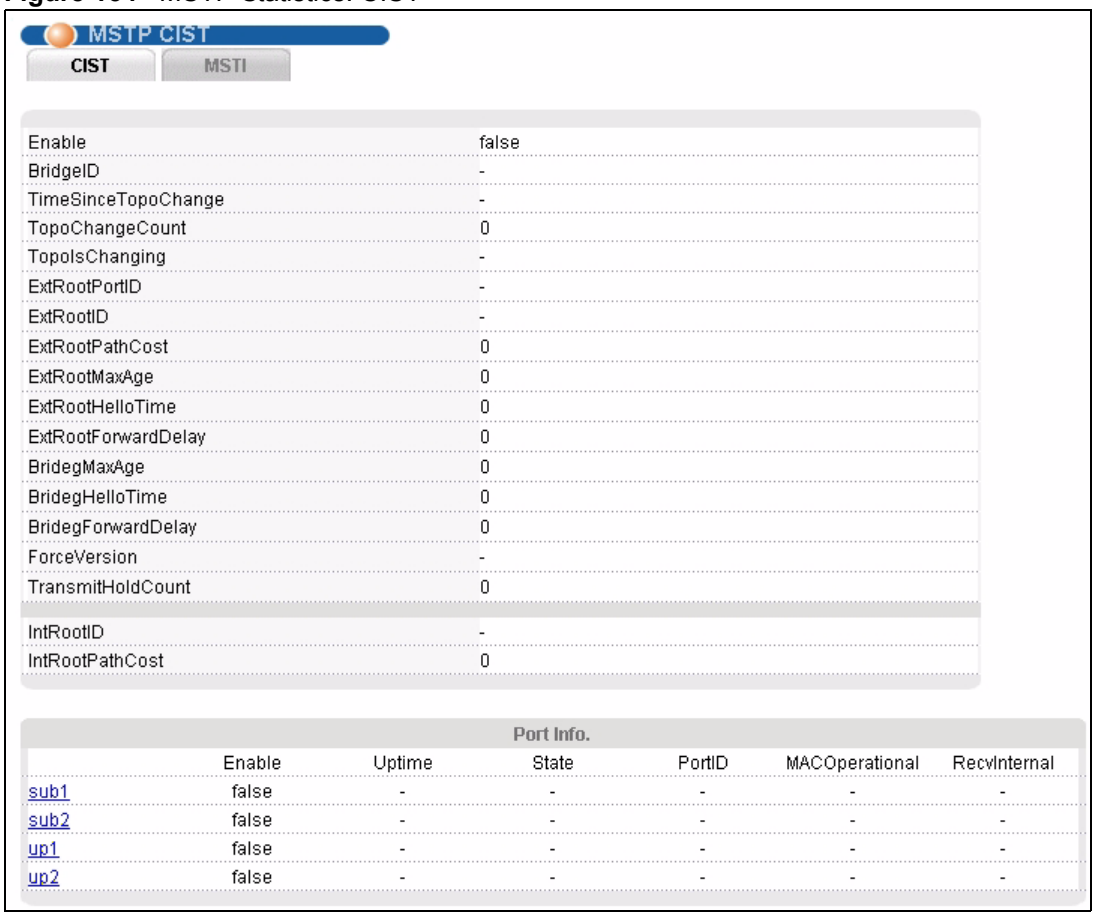
13.14 MSTP Statistics

Use the MSTP statistics screen to displays the status and statistics for the device's MSTP CIST (Common and Internal Spanning Tree) and MSTI ((Multiple Spanning Tree Instance) settings. Refer to Section 14.9 on page 270 for more background information.

13.14.1 MSTP CIST Statistics

Click **Statistics** > **MSTP** in the navigation panel to display the **MSTP CIST** statistics screen.

Figure 154 MSTP Statistics: CIST



The following table describes the labels in this screen.

Table 107 MSTP Statistics: CIST

LABEL	DESCRIPTION
Enable	This field displays whether MSTP is activated on the device.
BridgeID	This is the unique identifier for this bridge, consisting of bridge priority plus MAC address. This ID is the same in **ExtRootID** if this device is the root switch.
TimeSinceTopoChange	This is the time since the spanning tree was last reconfigured.
TopoChangeCount	This is the number of times the spanning tree has been reconfigured.
TopoIsChanging	The spanning tree is currently reconfiguring if “True” displays.
ExtRootPortID	This is the unique identifier for the port that connects to the external root bridge.
ExtRootID	This is the unique identifier for the external root bridge, consisting of bridge priority plus MAC address.
ExtRootPathCost	This is the path cost of the link to the root bridge.
ExtRootMaxAge	This is the maximum time (in seconds) the spanning tree can wait without receiving a configuration message before attempting to reconfigure on the root port.

Table 107 MSTP Statistics: CIST (continued)

LABEL	DESCRIPTION
ExtRootHelloTime	This is the time interval (in seconds) at which the root transmits a configuration message through the root port. The root bridge determines the Hello Time, Max Age and Forward Delay.
ExtRootForwardDelay	This is the time (in seconds) the root bridge will wait before changing states (that is, listening to learning or learning to forwarding) on the root port. Each change in states requires the forward delay time before the change.
BridegMaxAge	This is the maximum time (in seconds) the root bridge can wait without receiving a configuration message before attempting to reconfigure.
BridegHelloTime	This is the time interval (in seconds) at which the root switch transmits a configuration message. The root bridge determines the Hello Time, Max Age and Forward Delay.
BridegForwardDelay	This is the time (in seconds) the root switch will wait before changing states (that is, listening to learning to forwarding).
ForceVersion	This is the version of spanning tree protocol the device is using (**MSTP** or **RSTP**). The system will send BPDUs of the specified spanning tree version.
TransmitHoldCount	This is the number of BPDUs that are allowed to be sent before pausing for 1 second.
IntRootID	This field displays the ID of the root switch in a region.
IntRootPathCost	This field displays path cost to the internal root bridge.
Port Info.	
sub1~up2	These are the MSC1000G's subtending and uplink Ethernet ports. Click a link to see detailed MSTP CIST statistics for that port.
Enable	This field displays whether a port is active or not.
Uptime	This field displays the time the port is running.
State	This field displays the STP status on this port.
PortID	This field displays port ID.
MACOperational	This field displays true when the link is up or false if the link is not up.
RecvInternal	This field displays whether the BPDU received was transmitted by a bridge in the same region.

13.14.2 MSTP CIST Statistics: Port Details

Click a port's link in the **Statistics > MSTP** screen to see detailed MSTP CIST statistics for that port.

Figure 155 MSTP Statistics: CIST: Port Details

Port Info. enet1			
Enable	-	Uptime	-
State	-	PortID	-
DsgBridgeID	-	DsgPortID	-
ExtPortPathCost	0	ExtRootID	-
ExtRootPathCost	0	AdminEdgePort	-
OperEdgePort	-	MACOperational	-
AdminP2PLink	-	OperP2PLink	-
PortHelloTime	0	RecvInternal	-
RxStpCfgBPDU	0	RxStpTcnBPDU	0
RxRstpBPDU	0	RxMstpBPDU	0
IntPortPathCost	0	IntRootID	-

The following table describes the labels in this screen.

Table 108 MSTP Statistics: CIST: Port Details

LABEL	DESCRIPTION
Enable	This field displays whether MSTP is activated on the device.
Uptime	This field displays the time the port is running.
State	This field displays the STP status on this port.
PortID	This field displays port ID.
DsgBridgeID	This is the unique identifier for the bridge in the LAN segment to which this bridge belongs that has the lowest path cost to reach the root bridge, consisting of bridge priority plus MAC address.
DsgPortID	This is the port on the designated bridge that has the lowest path cost to reach the root bridge, consisting of bridge priority.
ExtPortPathCost	This field displays the path cost of this port to an external bridge (a bridge in a different MST region).
ExtRootID	This is the unique identifier for the external root bridge, consisting of bridge priority plus MAC address.
ExtRootPathCost	This is the path cost of the link to the root bridge.
AdminEdgePort	An edge port connects to a non-STP device (such as a computer or a hub). This field displays whether or not an administrator has set this port as an edge port.
OperEdgePort	This field displays whether or not the spanning tree network has determined this port to be an edge port.
MACOperational	This field displays true when the link is up or false if the link is not up.
AdminP2PLink	This field displays whether or not an administrator has set this port as a point-to-point link to the neighbor switch.
OperP2PLink	This field displays whether or not the spanning tree network has determined this port to be a point-to-point link to the neighbor switch.
PortHelloTime	This is the time interval (in seconds) at which the port transmits a configuration message.
RecvInternal	This field displays whether the BPDU received was transmitted by a bridge in the same region.
RxStpCfgBPDU	This is the number of legacy STP configuration BPDUs that have been received on this port.
RxStpTcnBPDU	This is the total number of legacy STP topology change notification BPDUs that have been received on this port.

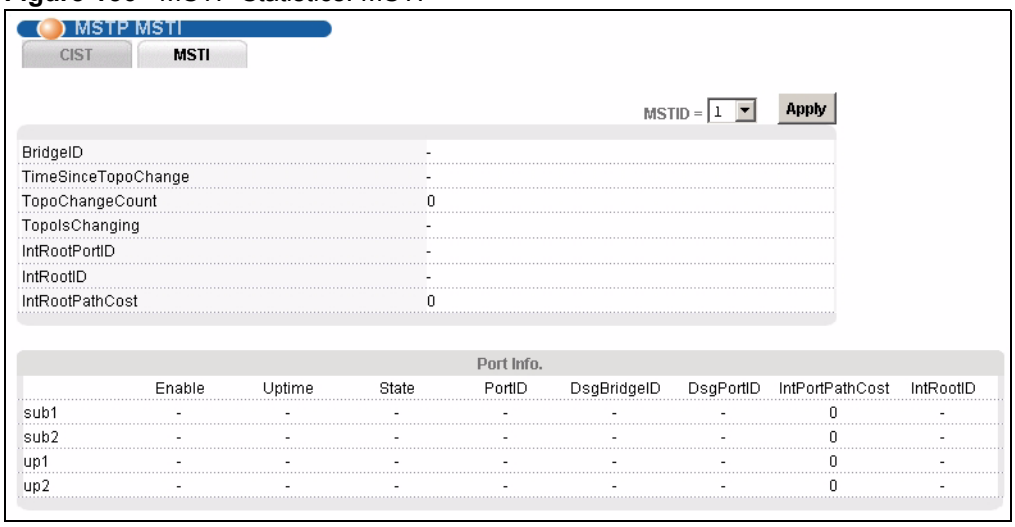
Table 108 MSTP Statistics: CIST: Port Details (continued)

LABEL	DESCRIPTION
RxRstpBPDU	This is the number of RSTP BPDUs that have been received on this port.
RxMstpBPDU	This is the number of MSTP BPDUs that have been received on this port.
IntPortPathCost	This is the path cost to the internal root bridge.
IntRootID	This is the ID of the internal root bridge.

13.14.3 MSTP MSTI Statistics

Click **Statistics > MSTP > MSTI** to display the **MSTP MSTI** statistics screen. Use this screen to view the port status of a selected spanning tree instance.

Figure 156 MSTP Statistics: MSTI



The following table describes the labels in this screen.

Table 109 MSTP Statistics: MSTI

LABEL	DESCRIPTION
MSTID	Select an MSTI number and click **Apply** to display the port status for that spanning tree instance.
BridgeID	This is the unique identifier for this bridge, consisting of bridge priority plus MAC address.
TimeSinceTopoChange	This is the time since the spanning tree was last reconfigured.
TopoChangeCount	This is the number of times the spanning tree has been reconfigured.
TopoIsChanging	The spanning tree is currently reconfiguring if “True” displays.
IntRootPathCost	This field displays path cost to the internal root bridge.
IntRootID	This field displays the ID of the root switch in a region.
IntPortPathCost	This is the path cost to the internal root bridge.
Port Info.	
sub1~up2	These are the MSC1000G’s subtending and uplink Ethernet ports.
Enable	This field displays whether a port is active or not.

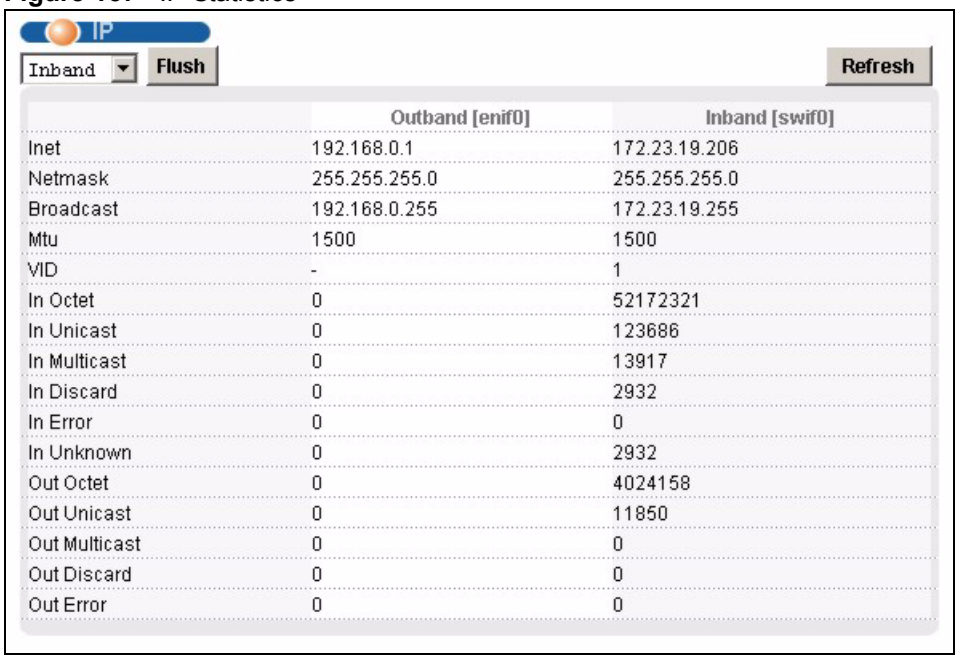
Table 109 MSTP Statistics: MSTI (continued)

LABEL	DESCRIPTION
Uptime	This field displays the time the port is running.
State	This field displays the STP status on this port.
PortID	This field displays port ID.
DsgBridgeID	This is the unique identifier for the bridge in the LAN segment to which this bridge belongs that has the lowest path cost to reach the root bridge, consisting of bridge priority plus MAC address.
DsgPortID	This is the port on the designated bridge that has the lowest path cost to reach the root bridge, consisting of bridge priority.
IntRootPathCost	This field displays path cost to the internal root bridge.
IntRootID	This field displays the ID of the root switch in a region.

13.15 IP Statistics

To view management IP settings and statistics, click **Statistics > IP** in the navigation panel.

Figure 157 IP Statistics



The following table describes the labels in this screen.

Table 110 IP Statistics

LABEL	DESCRIPTION
Flush	Click **Flush** to reset the counters for the selected port.
Refresh	Click **Refresh** to update this screen.
Inet	This field displays the management IP address.
Netmask	This field displays the subnet mask for the IP address above.
Broadcast	This field displays the broadcast address.

Table 110 IP Statistics (continued)

LABEL	DESCRIPTION
Mtu	This field displays the size of the Maximum Transmission Unit (MTU).
In Octet	This field displays the number of octets received on this port.
In Unicast	This field displays the number of unicast packets received on this port.
In Multicast	This field displays the number of multicast packets received on this port.
In Discard	This field displays the number of discarded packets received on this port.
In Error	This field displays the number of errored packets received on this port.
In Unknown	This field displays the number of packets with an unknown source received on this port.
Out Octet	This field displays the number of octets transmitted on this port.
Out Unicast	This field displays the number of unicast packets transmitted on this port.
Out Multicast	This field displays the number of multicast packets transmitted on this port.
Out Discard	This field displays the number of discarded packets transmitted on this port.
Out Error	This field displays the number of errored packets transmitted on this port.
Out Unknown	This field displays the number of packets with an unknown source transmitted on this port.

14

Switch Screens

This chapter describes the screens you use to configure Ethernet ports, multicast VLAN and global switch parameters such as GARP, link aggregation, priority queues and queuing method.

14.1 Ethernet Port Trunking

Ethernet port trunking lets you aggregate the Ethernet ports into one logical link. The switch uses MAC-based load balancing which analyzes a packet's source and destination MAC addresses to distribute the load between the two Ethernet ports when uplinking to the remote switch.

The remote switch must also support Ethernet port trunking. The load-balancing method, however, does not have to be the same as on this switch.

The two uplink ports or two subtending ports must be connected to a single remote switch when port trunking is enabled.

14.2 Dynamic Link Aggregation

The MSC1000G adheres to the IEEE 802.3ad standard for static and dynamic (LACP) port trunking.

The MSC1000G supports the link aggregation IEEE 802.3ad standard. This standard describes the Link Aggregate Control Protocol (LACP), which is a protocol that dynamically creates and manages trunk groups.

When you enable LACP link aggregation on a port, the port can automatically negotiate with the ports at the remote end of a link to establish trunk groups. LACP also allows port redundancy, that is, if an operational port fails, then one of the "standby" ports become operational without user intervention. Please note that:

- You must connect all ports point-to-point to the same Ethernet switch and configure the ports for LACP trunking.
- LACP only works on full-duplex links.
- All ports in the same trunk group must have the same media type, speed, duplex mode and flow control settings.

Configure trunk groups or LACP before you connect the Ethernet switch to avoid causing network topology loops.

14.3 Link Aggregation ID

LACP aggregation ID consists of the following information[3]:

Table 111 Link Aggregation ID: Local Switch

SYSTEM PRIORITY	MAC ADDRESS	KEY	PORT PRIORITY	PORT NUMBER
0000	00-00-00-00-00	0000	00	0000

Table 112 Link Aggregation ID: Peer Switch

SYSTEM PRIORITY	MAC ADDRESS	KEY	PORT PRIORITY	PORT NUMBER
0000	00-00-00-00-00	0000	00	0000

14.4 Queuing Overview

Queuing is used to help solve performance degradation when there is network congestion.

Queuing algorithms allow switches to maintain separate queues for packets from each individual source or flow and prevent a source from monopolizing the bandwidth.

The switch has eight physical queues, Q0 to Q7. Q7 has the highest priority and Q0 has the lowest.

Table 113 Physical Queue Priority

QUEUE	PRIORITY
Q7	8 (Highest)
Q6	7
Q5	6
Q4	5
Q3	4
Q2	3
Q1	2
Q0	1 (Lowest)

3. Port Priority and Port Number are 0 as it is the aggregator ID for the trunk group, not the individual port.

14.4.1 Strict Priority Queuing (SPQ)

Strict Priority Queuing (SPQ) services queues based on priority only. As traffic comes into the switch, traffic on the highest priority queue, Q7 is transmitted first. When that queue empties, traffic on the next highest-priority queue, Q6 is transmitted until Q6 empties, and then traffic is transmitted on Q5 and so on. If higher priority queues never empty, then traffic on lower priority queues never gets sent. SPQ does not automatically adapt to changing network requirements.

14.4.2 Weighted Round Robin Scheduling (WRR)

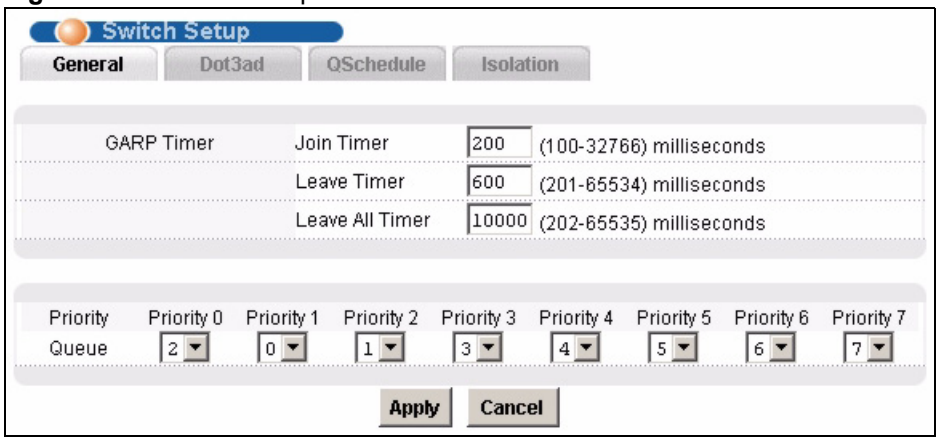
Round Robin Scheduling services queues on a rotating basis and is activated only when a port has more traffic than it can handle. A queue is a given an amount of bandwidth irrespective of the incoming traffic on that port. This queue then moves to the back of the list. The next queue is given an equal amount of bandwidth, and then moves to the end of the list; and so on, depending on the number of queues being used. This works in a looping fashion until a queue is empty.

Weighted Round Robin Scheduling (WRR) uses the same algorithm as round robin scheduling, but services queues based on their priority and queue weight (the number you configure in the queue weight fields) rather than a fixed amount of bandwidth. WRR is activated only when a port has more traffic than it can handle. Queues with larger weights get more service than queues with smaller weights. This queuing mechanism is highly efficient in that it divides any available bandwidth across the different traffic queues and returns to queues that have not yet emptied.

14.5 Switch Setup General Screen

Click **Switch > Switch Setup** in the navigation panel to display the screen as shown.

Figure 158 Switch Setup General



The following table describes the labels in this screen.

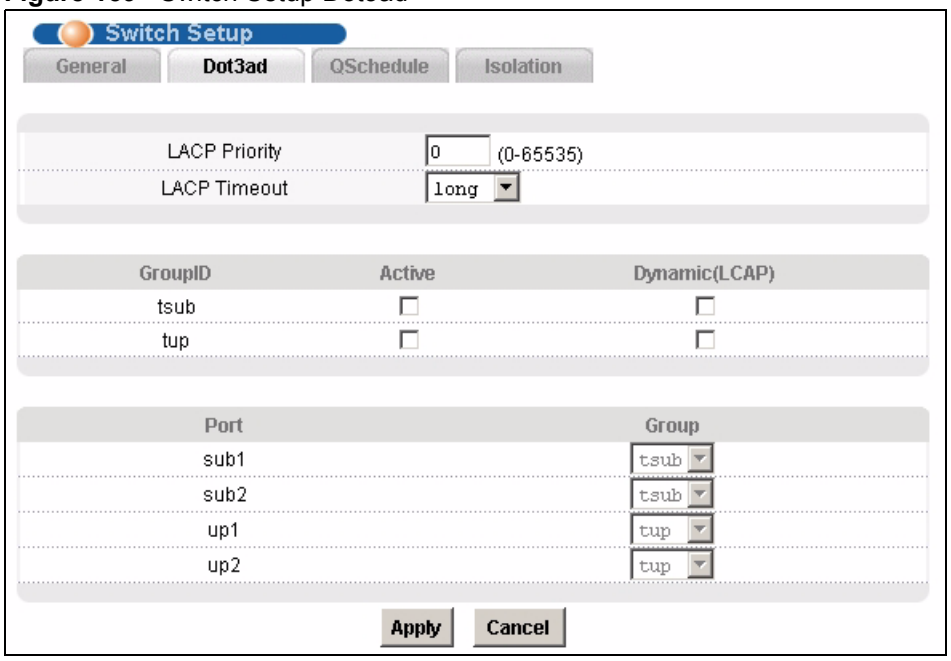
Table 114 Switch Setup General

LABEL	DESCRIPTION
GARP Timer: Switches join VLANs by making a declaration. A declaration is made by issuing a Join message using GARP. Declarations are withdrawn by issuing a Leave message. A Leave All message terminates all registrations. GARP timers set declaration timeout values. Refer to Chapter 16 on page 299 for more background information.	
Join Timer	Join Timer sets the duration of the Join Period timer for GVRP in milliseconds. Each port has a Join Period timer. The allowed Join Time range is between 100 and 65535 milliseconds; the default is 200 milliseconds. See the chapter on VLAN setup for more background information.
Leave Timer	Leave Timer sets the duration of the Leave Period timer for GVRP in milliseconds. Each port has a single Leave Period timer. Leave Time must be two times larger than Join Timer; the default is 600 milliseconds.
Leave All Timer	Leave All Timer sets the duration of the Leave All Period timer for GVRP in milliseconds. Each port has a single Leave All Period timer. Leave All Timer must be larger than Leave Timer; the default is 1000 milliseconds.
Priority Queue Assignment IEEE 802.1p defines up to 8 separate traffic types by inserting a tag into a MAC-layer frame that contains bits to define class of service. Frames without an explicit priority tag are given the default priority of the ingress port. Use the drop-down list boxes to configure the priority level-to-physical queue mapping. The system has 8 physical queues that you can map to the 8 priority levels. On the switch, traffic assigned to higher index queues gets through faster while traffic in lower index queues is dropped if the network is congested.	
Priority Levels (The following descriptions are based on the traffic types defined in the IEEE 802.1d standard (which incorporates IEEE 802.1p).	
Priority 7	Typically used for network control traffic such as router configuration messages.
Priority 6	Typically used for voice traffic that is especially sensitive to jitter (jitter is the variations in delay).
Priority 5	Typically used for video that consumes high bandwidth and is sensitive to jitter.
Priority 4	Typically used for controlled load, latency-sensitive traffic such as SNA (Systems Network Architecture) transactions.
Priority 3	Typically used for “excellent effort” or better than best effort and would include important business traffic that can tolerate some delay.
Priority 2	This is for “spare bandwidth”.
Priority 1	This is typically used for non-critical “background” traffic such as bulk transfers that are allowed but that should not affect other applications and users.
Priority 0	Typically used for best-effort traffic.
Apply	Click **Apply** to save the changes in this screen to the system’s volatile memory. The system loses these changes if it is turned off or loses power, so use the **Config Save** on the navigation panel and then the **Save** button to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to begin configuring this screen afresh.

14.6 Switch Setup Dot3ad Screen

Click **Switch > Switch Setup > Dot3ad** to display the screen as shown.

Figure 159 Switch Setup Dot3ad



The following table describes the labels in this screen.

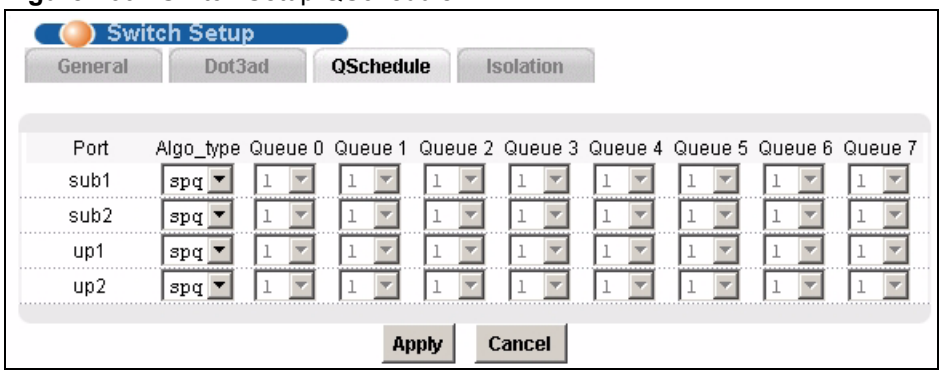
Table 115 Switch Setup Dot3ad

LABEL	DESCRIPTION
LACP Priority	Type a number between 1 and 65,535 for the LACP system priority. The switch with the lowest system priority (and lowest port number if system priority is the same) becomes the LACP “server”. The LACP “server” controls the operation of LACP setup. Enter a number to set the priority of an active port using Link Aggregate Control Protocol (LACP). The smaller the number, the higher the priority level.
LACP Timeout	LACP timeout is the time interval between the individual port exchanges of LACP packets in order to check that the peer port in the trunk group is still up. If a port does not respond after three tries, then it is deemed to be “down” and is removed from the trunk. Set a short timeout (one second) for busy trunked links to ensure that disabled ports are removed from the trunk group as soon as possible. Select either short (1 second) or long (30 seconds).
Group ID	This column displays the names of the trunk groups for the management switch card’s Ethernet ports. **tsub** is for the management switch card’s subtending ports and **tup** is for the management switch card’s uplink ports.
Active	Select this check box to turn on a trunk group.
Dynamic(LCAP)	Select this check box to use Link Aggregate Control Protocol (LACP), to dynamically create and manage the trunk group.
Port	This column lists the management switch card’s Gigabit Ethernet interfaces.
Group	This column displays to which trunk group an MSC1000G Gigabit Ethernet interface belongs.
Apply	Click **Apply** to save the changes in this screen to the system’s volatile memory. The system loses these changes if it is turned off or loses power, so use the **Config Save** on the navigation panel and then the **Save** button to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to begin configuring this screen afresh.

14.7 Switch Setup QSchedule Screen

Click **Switch > Switch Setup > QSchedule** to display the screen as shown.

Figure 160 Switch Setup QSchedule



The following table describes the labels in this screen.

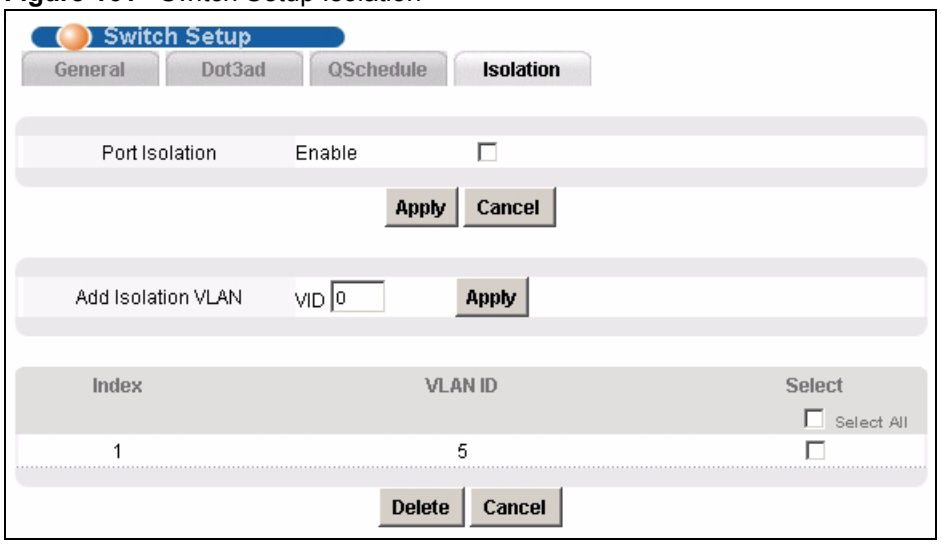
Table 116 Switch Setup QSchedule

LABEL	DESCRIPTION
Port	This column lists the management switch card's Gigabit Ethernet interfaces.
Algo_Type	Use this field to set a Gigabit Ethernet interface's queuing algorithm. If trunking is enabled, you set this for one interface and it applies to the whole trunk group. Select **spq** to use Strict Priority Queuing (SPQ). SPQ services queues based on priority only. When the highest priority queue empties, traffic on the next highest-priority queue begins. Select **wrr** to use Weighted Round Robin (WRR) Scheduling. WRR services queues on a rotating basis based on their queue weight (the number you configure in the queue weight fields). Queues with larger weights get more service than queues with smaller weights.
Queue 0~7	These fields apply when you select the **wrr** queuing algorithm in the **Algo_Type** field. Use these fields to set the priority weight (0~15) of each queue on a Gigabit Ethernet interface (or trunk group if trunking is enabled). The higher a queue's weight, the more service it gets.
Apply	Click **Apply** to save the changes in this screen to the system's volatile memory. The system loses these changes if it is turned off or loses power, so use the **Config Save** on the navigation panel and then the **Save** button to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to begin configuring this screen afresh.

14.8 Switch Setup Isolation Screen

Click **Switch > Switch Setup > Isolation** to display the screen as shown.

Figure 161 Switch Setup Isolation



The following table describes the labels in this screen.

Table 117 Switch Setup Isolation

LABEL	DESCRIPTION
Port Isolation	Turn on port isolation to block communications between subscriber ports. When you enable port isolation you do not need to configure the VLAN to isolate subscribers.
Apply	Click **Apply** to save the changes in this screen to the system's volatile memory. The system loses these changes if it is turned off or loses power, so use the **Config Save** on the navigation panel and then the **Save** button to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to begin configuring this screen afresh.
Add Isolation VLAN	The isolation VLAN fields display if you disable **Port Isolation**. Use isolation VLANs to block communications between subscribers in different VLANs if you do not block communications between subscriber ports. For example, you might want to isolate some VLAN (for example, high-speed Internet) and not isolate other VLAN (for example, VoIP).
VID	Specify the number of a VLAN for which you want to block communications with other VLANs.
Add	Click **Apply** to save your changes to the MSC1000G's volatile memory. The MSC1000G loses these changes if it is turned off or loses power, so use the **Config Save** link on the navigation panel to save your changes to the non-volatile memory when you are done configuring.
Index	This field displays the index number of the isolated VLAN.
VLAN ID	This field displays the number of a VLAN for which communications with other VLAN are blocked.
Select	Select an entry's **Select** check box and click **Delete** to remove the entry. Clicking **Delete** saves your changes to the MSC1000G's volatile memory. The MSC1000G loses these changes if it is turned off or loses power, so use the **Config Save** link on the navigation panel to save your changes to the non-volatile memory when you are done configuring.
Select All	Select this check box to select all of the column's check boxes. Clear this check box to clear all of the column's check boxes.

14.9 Spanning Tree Protocols

The switch supports Spanning Tree Protocol (STP), Rapid Spanning Tree Protocol (RSTP) and Multiple Spanning Tree Protocol (MSTP) as defined in the following standards.

- IEEE 802.1D Spanning Tree Protocol
- IEEE 802.1w Rapid Spanning Tree Protocol
- IEEE 802.1s Multiple Spanning Tree Protocol

14.9.1 STP and RSTP

RSTP adds rapid reconfiguration capability to STP. The switch supports RSTP and the earlier STP. RSTP and STP detect and break network loops and provide backup links between switches, bridges or routers. They allow a device to interact with other RSTP or STP-aware devices in your network to ensure that only one path exists between any two stations on the network. The switch uses RSTP by default but can still interoperate with STP switches (although without RSTP's benefits).

The root bridge is the base of the spanning tree; it is the bridge with the lowest identifier value (MAC address). Path cost is the cost of transmitting a frame onto a LAN through that port. It is assigned according to the speed of the link to which a port is attached. The slower the media, the higher the cost - see the following tables.

Table 118 STP Path Costs

LINK SPEED	RECOMMENDED VALUE	RECOMMENDED RANGE	ALLOWED RANGE
4Mbps	250	100 to 1000	1 to 65535
10Mbps	100	50 to 600	1 to 65535
16Mbps	62	40 to 400	1 to 65535
100Mbps	19	10 to 60	1 to 65535
1Gbps	4	3 to 10	1 to 65535
10Gbps	2	1 to 5	1 to 65535

Table 119 MSTP/RSTP Path Costs

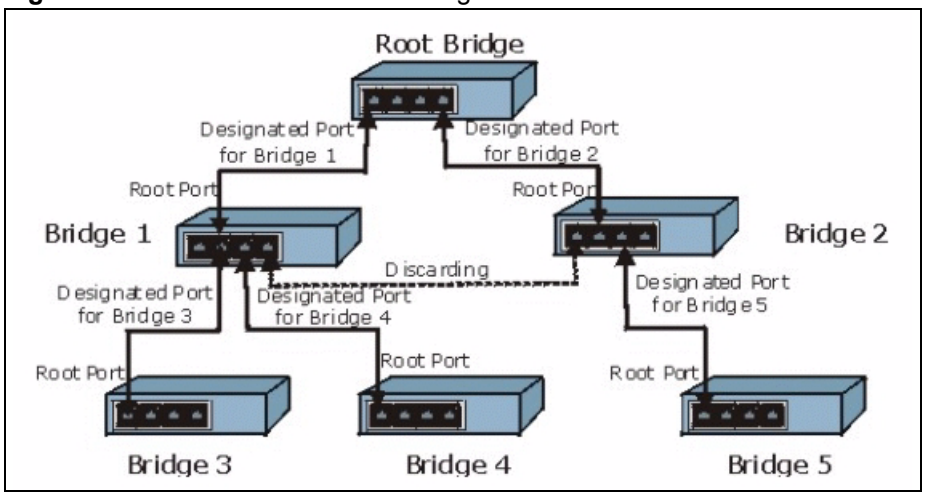
Link Speed	Recommended value	Recommended range	Allowed Range
<= 100 Kbps	200 000 000	200 000 000 to 200 000 000	1 to 200 000 000
1 Mbps	20 000 000	2 000 000 to 200 000 000	1 to 200 000 000
10 Mbps	2 000 000	200 000 to 20 000 000	1 to 200 000 000
100 Mbps	200 000	20 000 to 2 000 000	1 to 200 000 000
1 Gbps	20 000	2000 to 200 000	1 to 200 000 000
10 Gbps	2000	200 to 20 000	1 to 200 000 000
100 Gbps	200	20 to 2000	1 to 200 000 000
1000 Gbps	20	2 to 200	1 to 200 000 000
10 000 Gbps	2	1 to 20	1 to 200 000 000

On each bridge, the root port is the port through which this bridge communicates with the root. It is the port on this switch with the lowest path cost to the root (the root path cost). If there is no root port, then this switch has been accepted as the root bridge of the spanning tree network.

For each LAN segment, a designated bridge is selected. This bridge has the lowest cost to the root among the bridges connected to the LAN.

After a bridge determines the lowest cost-spanning tree with RSTP, it enables the root port and the ports that are the designated ports for the connected LANs, and disables all other ports that participate in RSTP. Network packets are therefore only forwarded between enabled ports, eliminating any possible network loops.

Figure 162 STP Root Ports and Designated Ports



RSTP-aware devices exchange Bridge Protocol Data Units (BPDUs) periodically. When the bridged LAN topology changes, a new spanning tree is constructed.

In RSTP, the devices send BPDUs every Hello Time. If an RSTP-aware device does not get a Hello BPDU after three Hello Times pass (or the Max Age), the device assumes that the link to the neighboring bridge is down. This device then initiates negotiations with other devices to reconfigure the network to re-establish a valid network topology.

In STP, once a stable network topology has been established, all devices listen for Hello BPDUs transmitted from the root bridge. If an STP-aware device does not get a Hello BPDU after a predefined interval (Max Age), the device assumes that the link to the root bridge is down. This device then initiates negotiations with other devices to reconfigure the network to re-establish a valid network topology.

RSTP assigns three port states to eliminate packet looping while STP assigns five (see following table). A device port is not allowed to go directly from blocking state to forwarding state so as to eliminate transient loops.

Table 120 RSTP and STP Port States

RSTP PORT STATE	STP PORT STATE	DESCRIPTION
Discarding	Disabled	STP is disabled (default).
Discarding	Blocking	Only configuration and management BPDUs are received and processed.
Discarding	Listening	All BPDUs are received and processed.

Table 120 RSTP and STP Port States

RSTP PORT STATE	STP PORT STATE	DESCRIPTION
Learning	Learning	All BPDUs are received and processed. Information frames are submitted to the learning process but not forwarded.
Forwarding	Forwarding	All BPDUs are received and processed. All information frames are received and forwarded.

14.9.2 Multiple STP

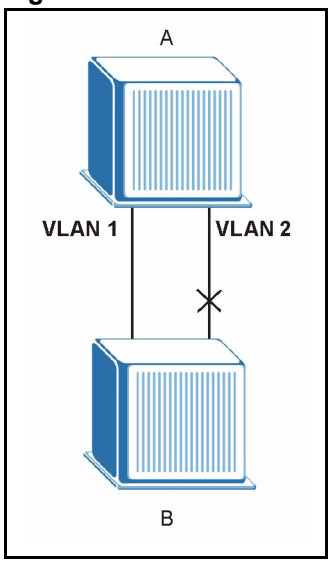
Multiple Spanning Tree Protocol (IEEE 802.1s) is backward compatible with STP/RSTP and addresses the limitations of existing spanning tree protocols (STP and RSTP) in networks to include the following features:

- One Common and Internal Spanning Tree (CIST) that represents the entire network's connectivity.
- Grouping of multiple bridges (or switching devices) into regions that appear as one single bridge on the network.
- Multiple Spanning Tree Instances (Mists) that allow multiple VLANs to use the same spanning tree.
- Load-balancing is possible as traffic from different VLANs can use distinct paths in a region.

14.9.2.1 MSTP Network Example

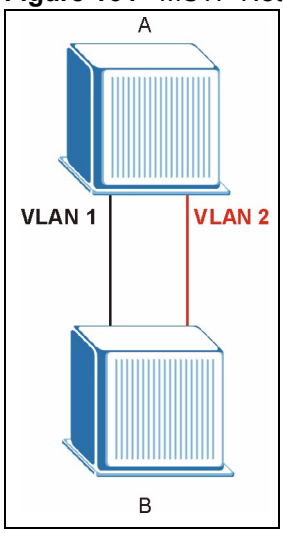
The following figure shows a network example where two VLANs are configured on the two switches. If the switches are using STP or RSTP, the link for VLAN 2 will be blocked as STP and RSTP allow only one link in the network and block the redundant link.

Figure 163 STP/RSTP Network Example



With MSTP, VLANs 1 and 2 are mapped to different spanning trees in the network. Thus traffic from the two VLANs travel on different paths. The following figure shows the network example using MSTP.

Figure 164 MSTP Network Example



14.9.2.2 MST Region

An MST region is a logical grouping of multiple network devices that appears as a single device to the rest of the network. Each MSTP-enabled device can only belong to one MST region. When BPDUs enter an MST region, external path cost (of paths outside this region) is increased by one. Internal path cost (of paths within this region) is increased by one when BPDUs traverse the region.

Devices that belong to the same MST region are configured to have the same MSTP configuration identification settings. These include the following parameters:

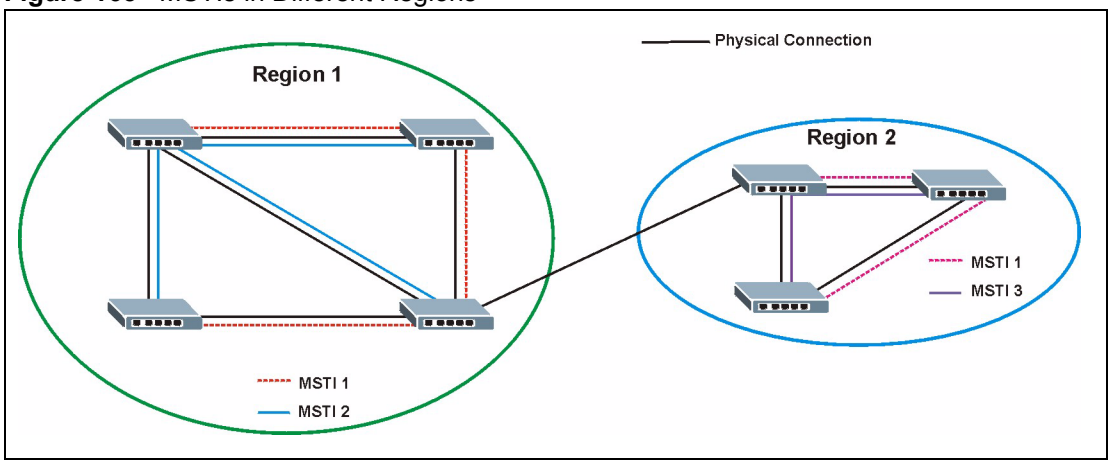
- Name of the MST region
- Revision level as the unique number for the MST region
- VLAN-to-MST mapping

14.9.2.3 MST Instance

An MST Instance (MSTI) is a set of VLANs that use the same spanning tree. Each created MSTI is identified by a unique number (known as an MST ID) known internally to a region. Thus an MSTI does not span across MST regions.

The following figure shows an example where there are two MST regions. Regions 1 and 2 have 2 spanning tree instances.

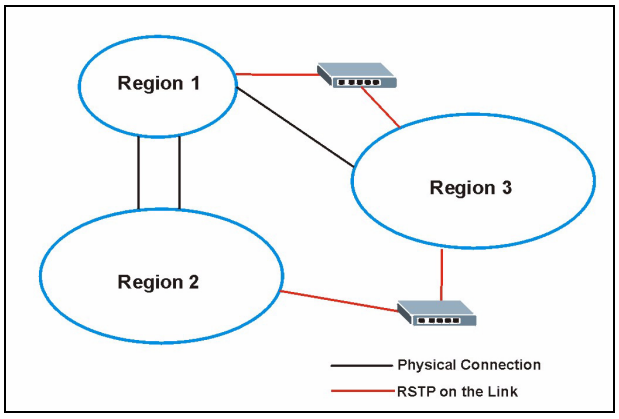
Figure 165 MSTIs in Different Regions



14.9.2.4 Common and Internal Spanning Tree (CIST)

A CIST represents the connectivity of the entire network and it is equivalent to a spanning tree in an STP/RSTP. The CIST is the default MST instance (MSTID 0). Any VLANs that are not members of an MST instance are members of the CIST. In an MSTP-enabled network, there is only one CIST that runs between MST regions and single spanning tree devices. A network may contain multiple MST regions and other network segments running RSTP.

Figure 166 MSTP and Legacy RSTP Network Example



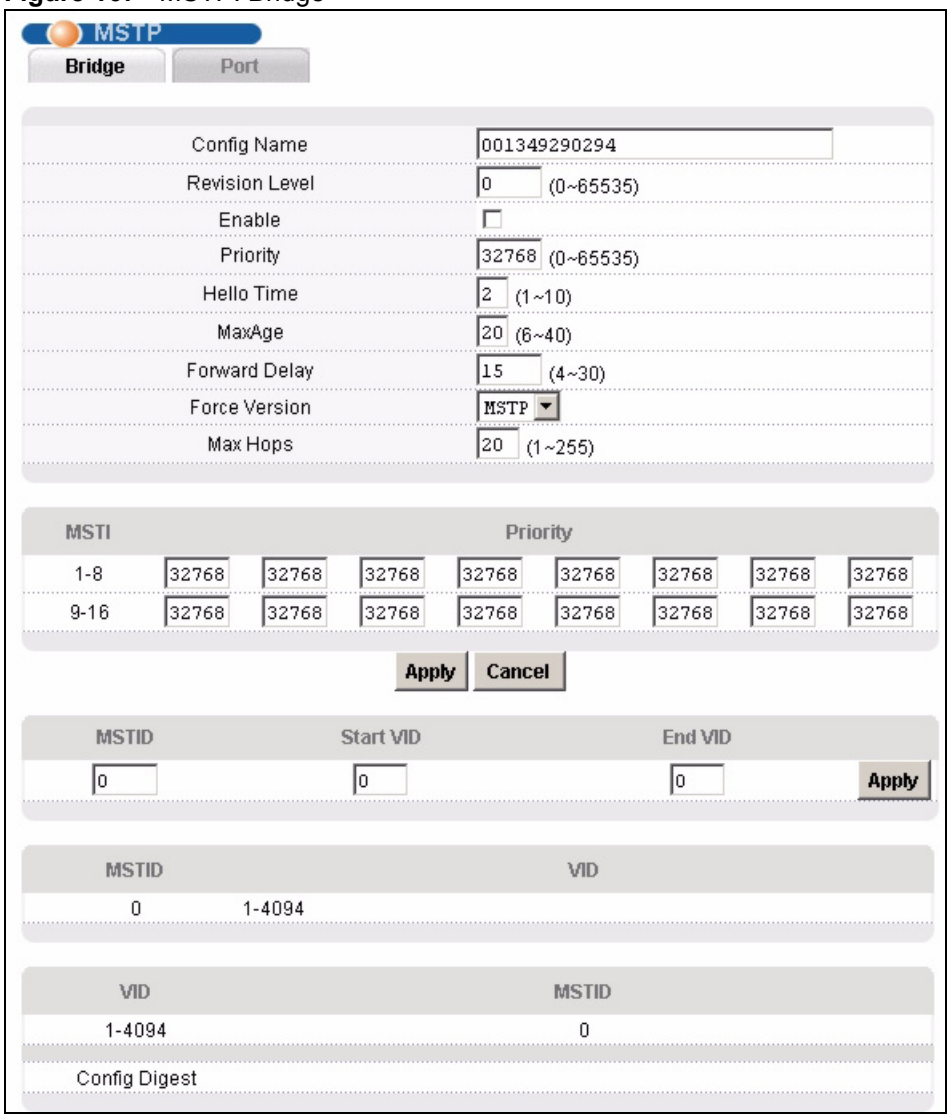
14.10 MSTP Setup

Use the MSTP screens to enable MSTP on the switch and configure MSTP bridge and port settings.

14.10.1 MSTP Bridge Settings

Click **Switch > MSTP** in the navigation panel to display the screen shown next. Use this screen to configure MSTP and RSTP settings.

Figure 167 MSTP: Bridge



The following table describes the labels in this screen.

Table 121 MSTP: Bridge

LABEL	DESCRIPTION
Config Name	Enter a descriptive name (up to 31 characters) of an MST region.
Revision Level	Enter a number to identify a region's configuration. Devices must have the same revision level to belong to the same region.
Enable	Select this option to activate MSTP on the system.
Priority	Priority is used in determining the root switch. The switch with the highest priority (lowest numeric value) becomes the STP root switch. If all switches have the same priority, the switch with the lowest MAC address will then become the root switch. Enter a number between 0 and 65535. The system will automatically round the number to the nearest multiple of 4096. The lower the numeric value you assign, the higher the priority for this switch. Bridge Priority determines the root bridge, which in turn determines Hello Time, Max Age and Forwarding Delay.

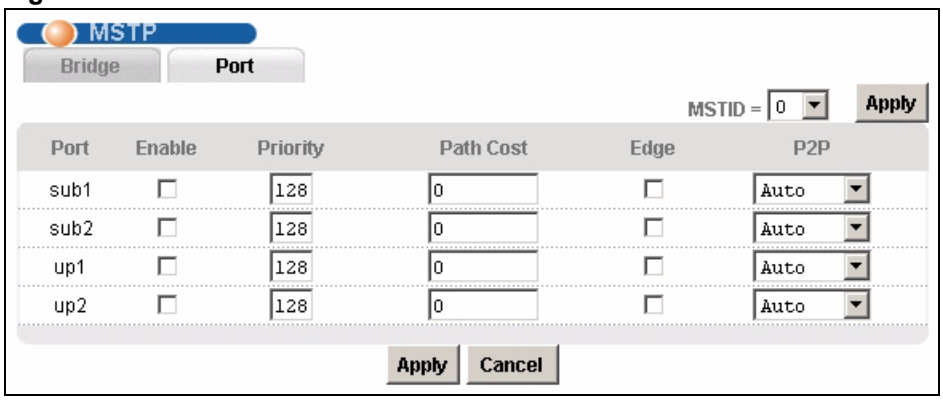
Table 121 MSTP: Bridge (continued)

LABEL	DESCRIPTION
Hello Time	This is the time interval in seconds between BPDU (Bridge Protocol Data Units) configuration message generations by the root switch. The allowed range is 1 to 10 seconds.
MaxAge	This is the maximum time (in seconds) a switch can wait without receiving a BPDU before attempting to reconfigure. All switch ports (except for designated ports) should receive BPDUs at regular intervals. Any port that ages out STP information (provided in the last BPDU) becomes the designated port for the attached LAN. If it is a root port, a new root port is selected from among the switch ports attached to the network. The allowed range is 6 to 40 seconds.
Forwarding Delay	This is the maximum time (in seconds) a switch will wait before changing states. This delay is required because every switch must receive information about topology changes before it starts to forward frames. In addition, each port needs time to listen for conflicting information that would make it return to a blocking state; otherwise, temporary data loops might result. The allowed range is 4 to 30 seconds. As a general rule: 2 * (Forward Delay - 1) >= Max Age >= 2 * (Hello Time + 1)
Force Version	Specify a spanning tree protocol (**MSTP** or **RSTP**) the switch is to use. Select **MSTP** to configure multiple spanning trees that allows a loop-free network for one or more VLANs. Only MSTP BPDUs will be sent. Select **RSTP** to send RSTP BPDUs and ignore any MSTP-specific information.
MaxHops	Enter the number of hops (between 1 and 255) in an MSTP region before the BPDU is discarded and the port information is aged.
MSTI	This field displays the MST instance number. The switch can identifies up to 16 spanning trees in a region.
Priority	Set the priority of the switch for the specific spanning tree instance. The lower the number, the more likely the switch will be chosen as the root bridge within the spanning tree instance. Enter priority values between 0 and 61440 in increments of 4096 (thus valid values are 4096, 8192, 12288, 16384, 20480, 24576, 28672, 32768, 36864, 40960, 45056, 49152, 53248, 57344 and 61440).
Apply	Click **Apply** to save the changes in this screen to the system's volatile memory. The system loses these changes if it is turned off or loses power, so use the **Config Save** on the navigation panel and then the **Save** button to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to start configuring this screen again.
MSTID	Enter the ID number (0 ~ 16) of a spanning tress to which you want to map the VLAN ID settings below.
Start VID	Enter the start of the VLAN ID range to map to the MST instance.
End VID	Enter the end of the VLAN ID range to map to the MST instance. To map only one VLAN, enter the same VID as the start VID.
Apply	Click **Apply** to add the VLAN-to-MST instance mapping. The new settings automatically displays in the tables below.
MSTID	This field displays the ID of an MST instance.
VID	This field displays the VID (or VID ranges) to which the MST instance is mapped.
Config Digest	A configuration digest is generated from the VLAN-MSTI mapping information. This field displays the 16-octet signature that is included in an MSTP BPDU. This field displays the digest when MSTP is activated on the system.

14.10.2 MSTP Port Settings

Click **Switch > MSTP > Port** to display the configuration screen as shown. Use this screen to set the MST settings on the switch ports.

Figure 168 MSTP: Port



The following table describes the labels in this screen.

Table 122 MSTP: Port

LABEL	DESCRIPTION
MSTID	Select an MST region ID from the drop-down list box and click **Apply** to set the port settings.
Port	This column lists the management switch card's Gigabit Ethernet interfaces.
Enable	Select this option to set the port to be a member of the selected MST region.
Priority	When a loop occurs and two ports have the same path cost, the port with a higher priority (lower numerical value) becomes the root port and the other port becomes an alternate port. Specify the port priority in the spanning tree. Enter a number (between 1 and 255). Enter a smaller number to have the switch select this port first. If two ports have the same priority, the switch will select the one with the smallest port ID (which consists of the port priority and port number).
Path Cost	When a loop occurs, MSTP selects the port with the lowest path cost to the root bridge. Specify the path cost (between 0 and 200000000) for the port. Enter a smaller number to have the switch select this port first. Enter 0 to have to system automatically determines the path cost based on the link speed. If two ports have the same path cost, the switch will select the one with the highest priority.
Edge	An edge port connects to a non-STP device. Select this option to set the port as an edge port. The switch immediately sets this port to the forwarding state when a link failure is detected. This allows for fast recovery.
P2P	Set a point-to-point link between ports to increase the speed of convergence by allowing the network to determine the designated port faster. The port must be connected directly to another switch port. Select **Enable** to activate this feature on a full-duplex port that is connected directly to another switch port. Select **Disable** to deactivate this feature on the port that is in half-duplex mode. Select **Auto** to have the system automatically determine if the port is full-duplex or half-duplex.

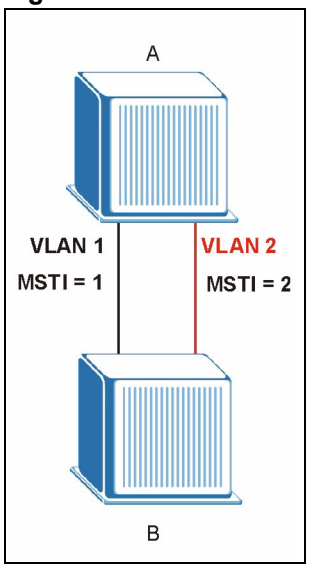
Table 122 MSTP: Port (continued)

LABEL	DESCRIPTION
Apply	Click **Apply** to save the changes in this screen to the system's volatile memory. The system loses these changes if it is turned off or loses power, so use the **Config Save** on the navigation panel and then the **Save** button to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to start configuring this screen again.

14.10.3 MSTP Configuration Example

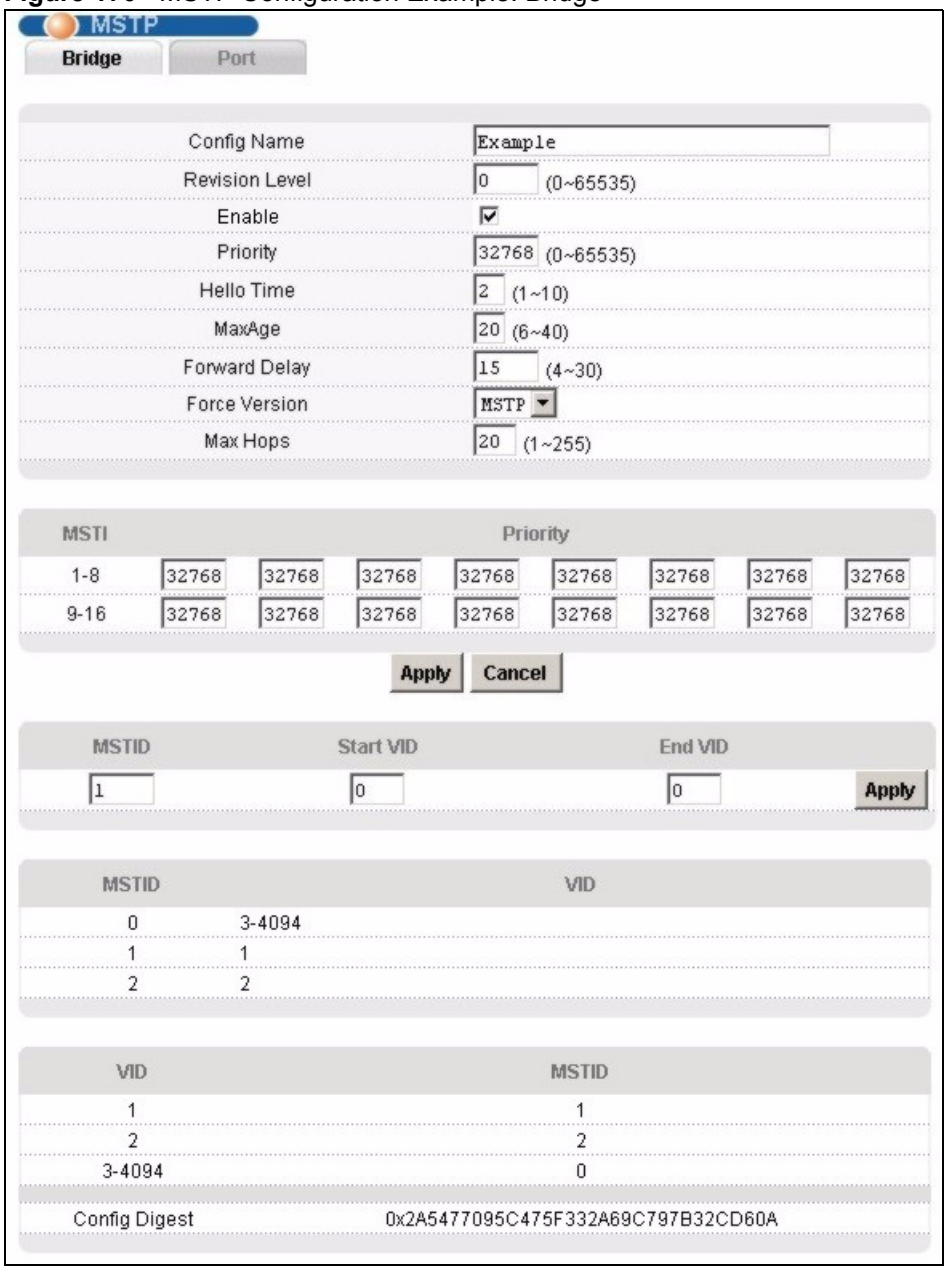
This section shows you how to configure MSTP settings for the network example shown. In this network example, there are two VLANs on two spanning tree instances.

Figure 169 MSTP Network Example 2



1. Log into the web configurator and access the **MSTP-Bridge** screen.
2. Specify a descriptive name in the **Config Name** field for the MSTP region.
3. Enter a number in the **Revision Level** field.
4. To create VLAN-to-MSTI mapping, set the **MSTID**, **Start VID** and **End VID** fields and click **Apply**. For this example, map VLAN 1 to MSTID 1 and VLAN 2 to MSTID 2.

Figure 170 MSTP Configuration Example: Bridge



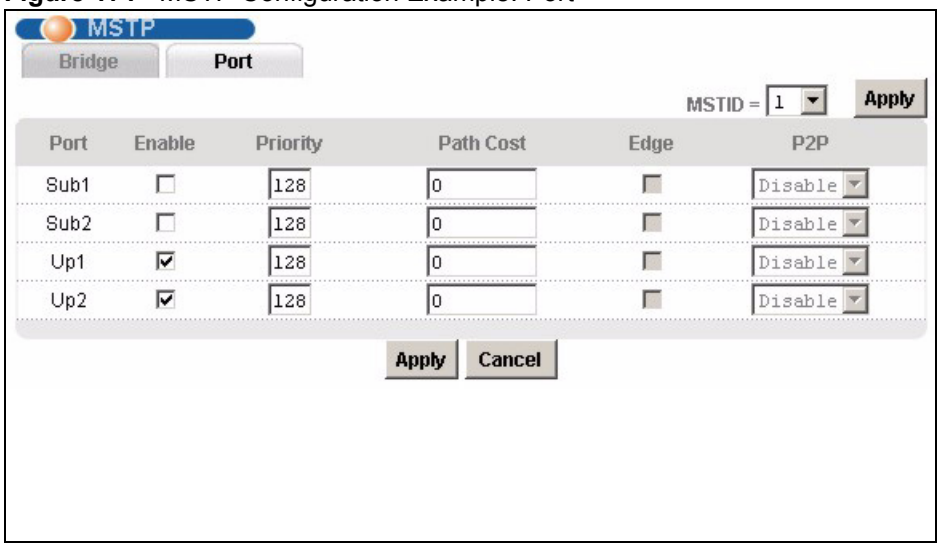
5 To configure port MSTP settings, click the **Port** tab.

6 Select the instance ID number in the **MSTID** field and click **Apply**.

7 Select **Enable** to set the port to belong to this spanning tree and click **Apply**.

For this network example, enable uplink ports 1 and 2 in the two spanning tree instances (MSTID 1 and 2).

Figure 171 MSTP Configuration Example: Port



8 For switch B, configure the same general MSTP settings and VLAN-to-MST mappings as switch A for the subtending ports.

9 Set the subtending port priorities on switch B to allow MSTP to forward traffic to the corresponding link.

In MSTID1, set the subtending port 1 priority to 0 and subtending port 2 priority to 240.

In MSTID2, set the subtending port 1 priority to 240 and subtending port 2 priority to 0.

Devices belonging to the same MST region must have the same settings in the **Config Name** and **Revision Level** fields and VLAN-MST instance mapping(s).

14.11 Switch Port

This section describes the switch port features and parameters.

14.11.1 Uplink and Subtending Modes

The Gigabit Ethernet SFP slots and ports can function in either subtending or uplink mode. Connect a port in uplink mode to an backbone Ethernet switch or router. The management switch card allows traffic between the ports in uplink mode and the DSL ports on the line cards.

Use the subtending mode to daisy-chain other Ethernet switches. With subtending mode, the management switch card allows traffic between the ports in subtending mode and the ports in uplink mode. The management switch card does not allow traffic between the ports in subtending mode and the DSL ports on the line cards.

14.11.2 Flow Control

A concentration of traffic on a port decreases port bandwidth and overflows buffer memory causing packet discards and frame losses. Flow control is used to regulate transmission of signals to match the bandwidth of the receiving port.

The MSC1000G uses IEEE 802.3x flow control in full duplex mode and back pressure flow control in half duplex mode.

IEEE 802.3x flow control is used in full duplex mode to send a pause signal to the sending port, causing it to temporarily stop sending signals when the receiving port memory buffers fill.

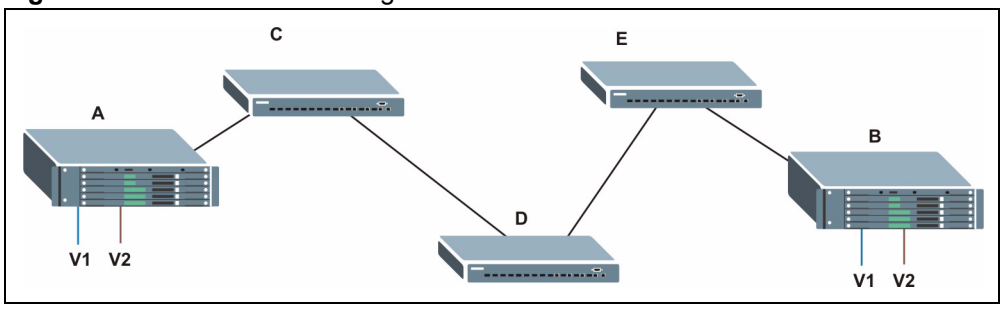
Back pressure flow control is typically used in half duplex mode to send a "collision" signal to the sending port (mimicking a state of packet collision) causing the sending port to temporarily stop sending signals and resend later.

14.11.3 Port VLAN Trunking

VLAN Trunking allows frames belonging to unknown VLAN groups to pass through a port. This is useful if you want to set up VLAN groups on end devices without having to configure the same VLAN groups on intermediary devices.

Refer to the following figure. Suppose you want to create VLAN groups 1 and 2 (V1 and V2) on devices A and B. Without **VLAN Trunking,** you must configure VLAN groups 1 and 2 on all intermediary switches C, D and E; otherwise they will drop frames with unknown VLAN group tags. However, with **VLAN Trunking** enabled on a port(s) in each intermediary switch you only need to create VLAN groups in the end devices (A and B). C, D and E automatically allow frames with VLAN group tags 1 and 2 (VLAN groups that are unknown to those switches) to pass through their VLAN trunking port(s).

Figure 172 Port VLAN Trunking



14.11.4 Bandwidth Control

Use bandwidth control to define a maximum allowable bandwidth for incoming and/or out-going traffic flows on individual Gigabit Ethernet interfaces. This may be useful for limiting backbone bandwidth usage and preventing viruses from using up all of the system’s resources.

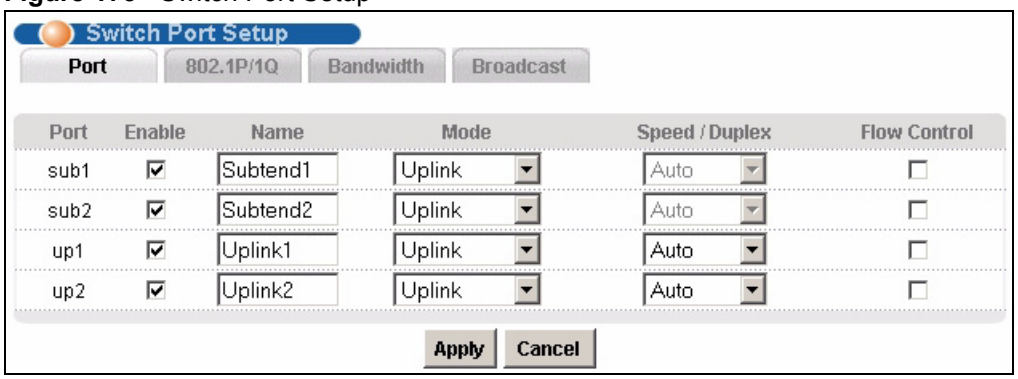
14.11.5 Broadcast Storm Control

Broadcast storm control limits the number of broadcast, multicast and destination lookup failure (DLF) packets the switch receives per second on the ports. When the maximum number of allowable broadcast, multicast and/or DLF packets is reached per second, the subsequent packets are discarded. Enable this feature to reduce broadcast, multicast and/or DLF packets in your network. You can specify limits for each packet type on each port. DLF packets are also known as unknown unicast packets.

14.12 Switch Port Setup Port Screen

Click **Switch > Switch Port Setup** in the navigation panel to display the screen shown next. Use this screen to configure basic settings for the Gigabit Ethernet interfaces.

Figure 173 Switch Port Setup



The following table describes the labels in this screen.

Table 123 Switch Port Setup

LABEL	DESCRIPTION
Port	This is the label of a Gigabit Ethernet interface.
Enable	Select this check box to turn on an interface. The factory default for all ports is enabled. A port must be enabled for data transmission to occur.
Name	Enter a descriptive name that identifies this port. You can use up to 31 English keyboard characters; spaces are not allowed.
Mode	Set a port as subtending to daisy-chain other Ethernet switches. Use uplink mode to connect to a backbone Ethernet switch or router.
Speed/Duplex	Select the type of Ethernet connection for this port. When you don't use auto-negotiation, you must make sure that the settings of the peer Ethernet port are the same in order to connect. Select **Auto** (auto-negotiation) to have the system automatically determine the type of connection that the Ethernet port has. When the peer Ethernet device has auto-negotiation turned on, the system negotiates with the peer to determine the connection speed. If the peer Ethernet port does not have auto-negotiation turned on, the system determines the connection speed by detecting the signal on the cable and using full duplex. Select **1000/Full** if the Ethernet port has a 1000 MB connection. Select **100/Full** if the Ethernet port has a 100 MB full-duplex electrical connection. Select **100/Half** if the Ethernet port has a 100 MB half-duplex electrical connection.
Flow Control	Select this check box to turn on flow control on a port.

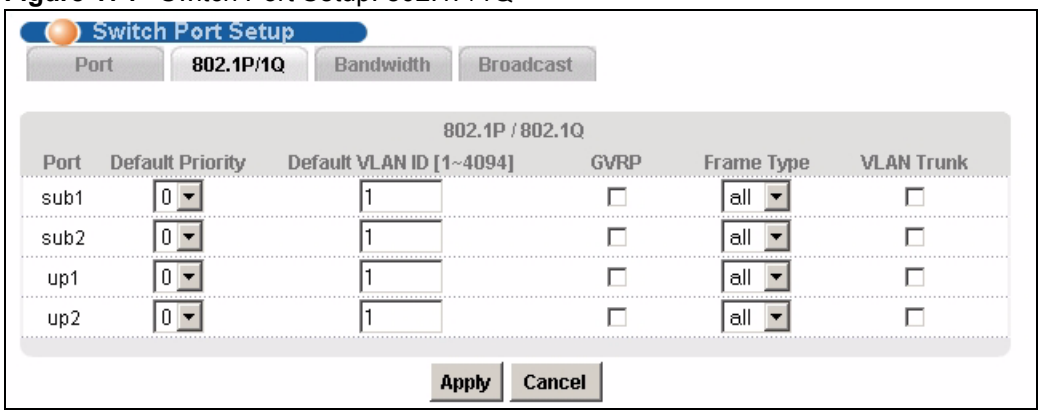
Table 123 Switch Port Setup (continued)

LABEL	DESCRIPTION
Apply	Click **Apply** to save the changes in this screen to the system's volatile memory. The system loses these changes if it is turned off or loses power, so use the **Config Save** on the navigation panel and then the **Save** button to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to begin configuring this screen afresh.

14.13 Switch Port Setup 802.1P/1Q Screen

Click **Switch > Switch Port Setup > 802.1P/1Q** in the navigation panel to display the screen shown next. Use this screen to configure IEEE 802.1p priority and IEEE 802.1Q VLAN settings for the Gigabit Ethernet interfaces.

Figure 174 Switch Port Setup: 802.1P/1Q



The following table describes the labels in this screen.

Table 124 Switch Port Setup: 802.1P/1Q

LABEL	DESCRIPTION
Port	This is the label of a Gigabit Ethernet interface.
Default Priority	Select a default priority to use for frames that come into the interface without a IEEE 802.1p priority tag.
Default VLAN ID [1-4094]	Select a default VLAN ID to use for frames that come into the interface without a IEEE 802.1Q VLAN ID.
GVRP	Select this check box to turn on GARP VLAN Registration Protocol to have the interface propagate VLAN information to other devices. Clear the check box to not have the interface propagate VLAN information to other devices.
Frame Type	Select **all** to have the interface accept all Ethernet frames. Select **tag** to have the interface only accept frames with an IEEE 802.1Q VLAN tag.
VLAN Trunk	Select this check box to have the interface use VLAN trunking in order to accept frames with any VID. Clear the check box to have the interface only accept frames with registered VIDs.

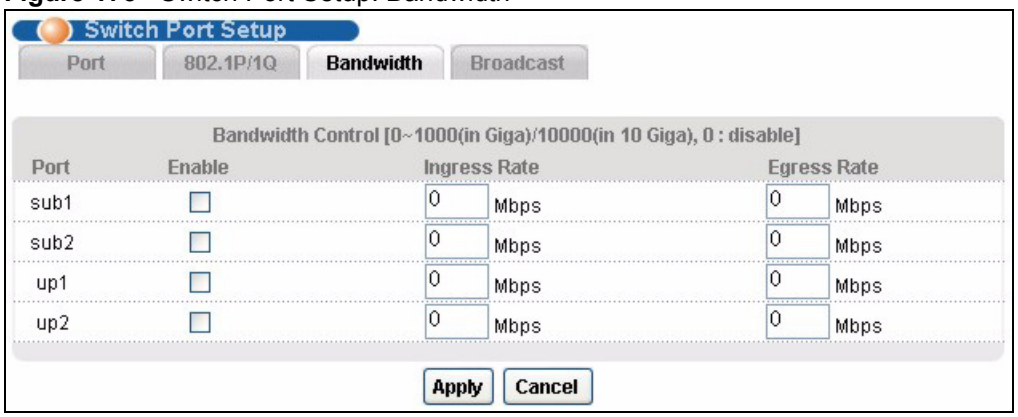
Table 124 Switch Port Setup: 802.1P/1Q (continued)

LABEL	DESCRIPTION
Apply	Click **Apply** to save the changes in this screen to the system's volatile memory. The system loses these changes if it is turned off or loses power, so use the **Config Save** on the navigation panel and then the **Save** button to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to begin configuring this screen afresh.

14.14 Switch Port Setup Bandwidth Screen

Click **Switch > Switch Port Setup > Bandwidth** in the navigation panel to display the screen shown next. Use this screen to configure bandwidth control settings for the Gigabit Ethernet interfaces.

Figure 175 Switch Port Setup: Bandwidth



The following table describes the labels in this screen.

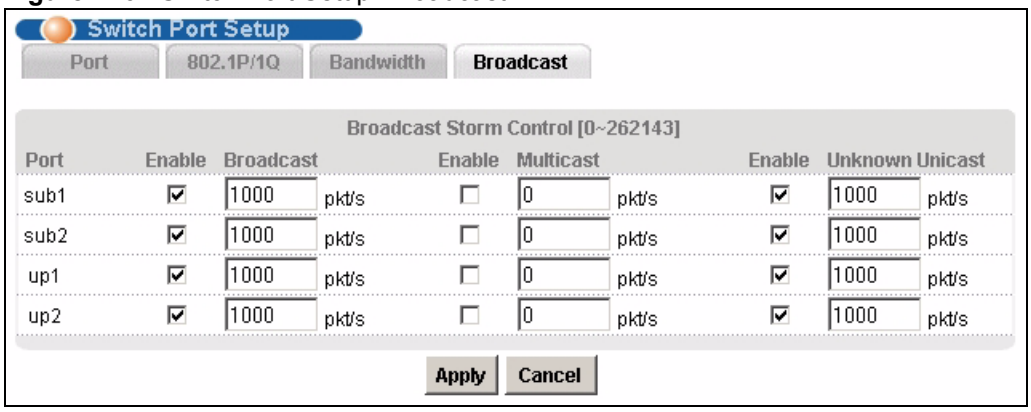
Table 125 Switch Port Setup: Bandwidth

LABEL	DESCRIPTION
Port	This is the label of a Gigabit Ethernet interface.
Enable	Select this check box to turn on bandwidth control for an interface.
Ingress Rate	Type a maximum bandwidth allowed for the incoming traffic flow on a port (measured in megabits per second). Use a number from 0 to 1000.
Egress Rate	Type a maximum bandwidth allowed for the out-going traffic flow on a port (measured in megabits per second). Use a number from 0 to 1000.
Apply	Click **Apply** to save the changes in this screen to the system's volatile memory. The system loses these changes if it is turned off or loses power, so use the **Config Save** on the navigation panel and then the **Save** button to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to begin configuring this screen afresh.

14.15 Switch Port Setup Broadcast Screen

Click **Switch > Switch Port Setup > Broadcast** in the navigation panel to display the screen shown next. Use this screen to configure broadcast storm control settings for the Gigabit Ethernet interfaces.

Figure 176 Switch Port Setup: Broadcast



The following table describes the labels in this screen.

Table 126 Switch Port Setup: Broadcast

LABEL	DESCRIPTION
Port	This is the label of a Gigabit Ethernet interface.
Broadcast	Select **Enable** to limit the number of broadcast packets the interface will accept per second. Type how many broadcast packets the interface should accept per second (0~262143).
Multicast	Select **Enable** to limit the number of multicast packets the interface will accept per second. Type how many multicast packets the interface should accept per second (0~262143).
Unknown Unicast	Select **Enable** to limit the number of unknown unicast packets the interface will accept per second. Unknown unicast packets are also known as destination lookup failure (DLF) packets. Type how many unknown unicast packets the interface should accept per second (0~262143).
Apply	Click **Apply** to save the changes in this screen to the system's volatile memory. The system loses these changes if it is turned off or loses power, so use the **Config Save** on the navigation panel and then the **Save** button to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to begin configuring this screen afresh.

15

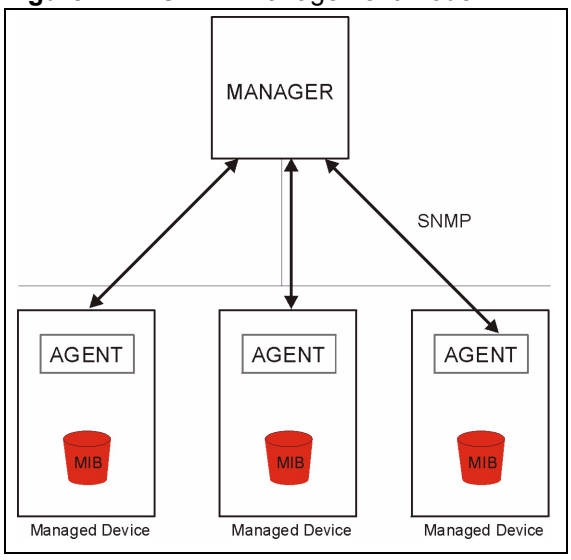
Sys Screens

This chapter describes the Sys screens you use to configure general system, access control, syslog, administrator login accounts and management IP settings.

15.1 SNMP

Simple Network Management Protocol is a protocol used for exchanging management information between network switches. SNMP is a member of TCP/IP protocol suite. A manager station can manage and monitor the MSC1000G through the network via SNMP version one (SNMPv1) and/or SNMP version 2c. The next figure illustrates an SNMP management operation. SNMP is only available if TCP/IP is configured.

Figure 177 SNMP Management Model



An SNMP managed network consists of two main components: agents and a manager.

An agent is a management software module that resides in a managed switch (the MSC1000G). An agent translates the local management information from the managed switch into a form compatible with SNMP. The manager is the console through which network administrators perform network management functions. It executes applications that control and monitor managed devices.

The managed devices contain object variables/managed objects that define each piece of information to be collected about a switch. Examples of variables include such as number of packets received, node port status etc. A Management Information Base (MIB) is a collection of managed objects. SNMP allows a manager and agents to communicate for the purpose of accessing these objects.

SNMP itself is a simple request/response protocol based on the manager/agent model. The manager issues a request and the agent returns responses using the following protocol operations:

Table 127 SNMP Commands

COMMAND	DESCRIPTION
Get	Allows the manager to retrieve an object variable from the agent.
GetNext	Allows the manager to retrieve the next object variable from a table or list within an agent. In SNMPv1, when a manager wants to retrieve all elements of a table from an agent, it initiates a Get operation, followed by a series of GetNext operations.
Set	Allows the manager to set values for object variables within an agent.
Trap	Used by the agent to inform the manager of some events.

15.1.1 Supported MIBs

MIBs let administrators collect statistics and monitor status and performance. The MSC1000G supports the following MIBs:

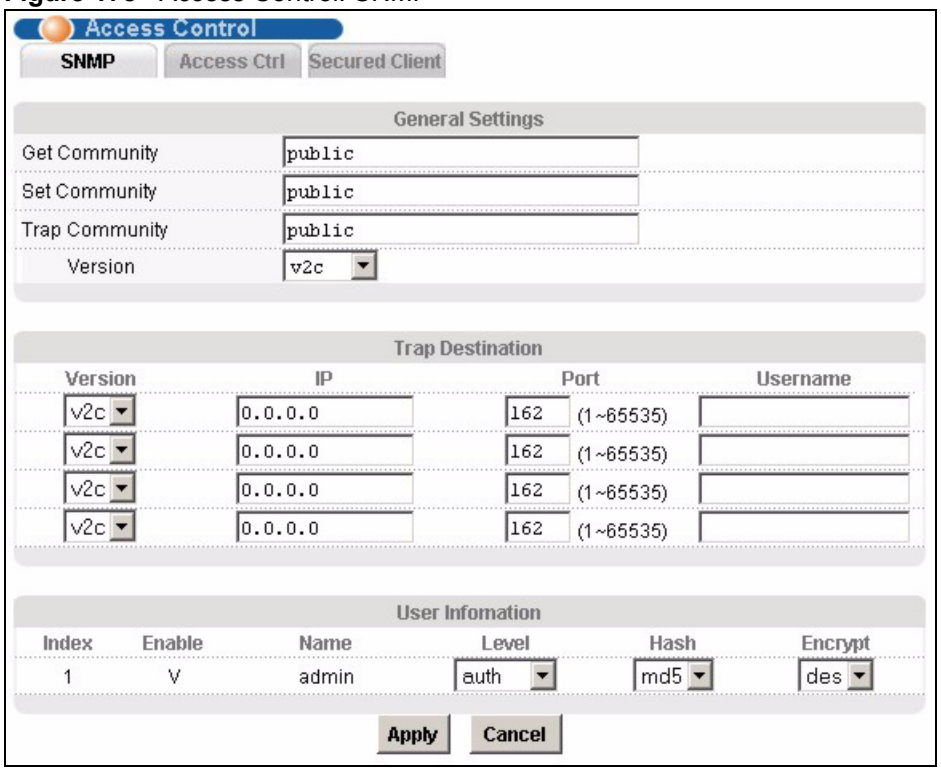
- SNMP MIB II (RFC 1213)
- BRIDGE MIB (RFC 1573) dot1dStp (RSTP), dot1dGarp (GARP)
- BRIDGE Extension MIB (RFC 2674)
- Dot3 MIB (RFC 2665)
- ADSL Line MIB (RFC 2662)
- ADSL Extension Line MIB (RFC 3440)
- RMON MIB (RFC 1757)
- ifXTable MIB (RFC 2863)
- RFC 3635
- RFC 3636

The MSC1000G can also respond with specific data from the ZyXEL private ies5000 MIB.

15.2 SNMP Screen

Click **Sys > Access Control** from the navigation panel to open the following screen.

Figure 178 Access Control: SNMP



The following table describes the labels in this screen.

Table 128 Access Control: SNMP

LABEL	DESCRIPTION
Get Community	Enter the get community, which is the password for the incoming Get- and GetNext- requests from the management station. You can use up to 31 English keyboard characters; spaces are not allowed.
Set Community	Enter the set community, which is the password for incoming Set- requests from the management station. You can use up to 31 English keyboard characters; spaces are not allowed.
Trap Community	Enter the trap community, which is the password sent with each trap to the SNMP manager. You can use up to 31 English keyboard characters; spaces are not allowed.
Version	Specify the SNMP version and access mode. Select **v2c** to allow SNMPv2 read/write access. Select **v3** to allow SNMPv3 read/write access with additional user authentication and data encryption options. Select **v3v2c** to allow SNMPv3 read/write and SNMPv2 read-only access.
Trap Destination	Enter the IP address of a station to send your SNMP traps to.
Version	Specify the format of the SNMP trap PDU (Protocol Data Unit) to be sent. The default is **v2c**.
IP	Enter the IP address (in dotted decimal notation) of the trap server.
Port	Enter the port number upon which the station listens for SNMP traps.
Username	This field is applicable when you select **v3** in the **Version** field. Enter the username to be included in the trap PDUs.

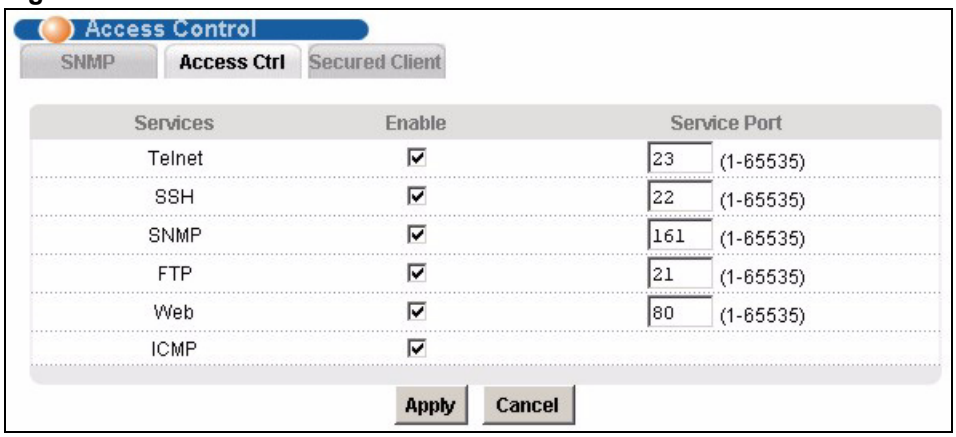
Table 128 Access Control: SNMP (continued)

LABEL	DESCRIPTION
User Information	Configure the administrative login accounts for SNMP management. Use the **User Account** screen to create administrative login accounts. See Section 15.7 on page 295.
Index	This field displays the index number.
Enable	This field displays whether the administrative login account is activated or note.
Name	This field displays the administrative login account user name.
Level	Select **noauth** to disable SNMPv3 user authentication and encryption for SNMP communication. Select **auth** to enable SNMPv3 user authentication. Select **privacy** to enable SNMPv3 user authentication and encryption for SNMP communication using a private key generated from the password.
Hash	Specify an authentication method. Select **md5** (Message Digest 5) to produce a 128-bit digest for minimal authentication security. Select **sha** (Secure Hash Algorithm) to produces a 160-bit digest for maximum authentication security.
Encrypt	Specify an encryption method. Select **des** or **aes**. Data Encryption Standard (DES) is a widely used method of data encryption using a secret key. DES applies a 56-bit key to each 64-bit block of data. Advanced Encryption Standard (AES) is a newer method of data encryption that also uses a secret key. AES is more secure than DES.
Apply	Click **Apply** to save the changes in this screen to the system's volatile memory. The system loses these changes if it is turned off or loses power, so use the **Config Save** on the navigation panel and then the **Save** button to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to begin configuring this screen afresh.

15.3 Service Access Control Screen

Click **Sys > Access Control** > **Access Ctrl** to open the following screen. Use this screen to set which services may be used to access the system.

Figure 179 Access Control: Service Access Control



The following table describes the labels in this screen.

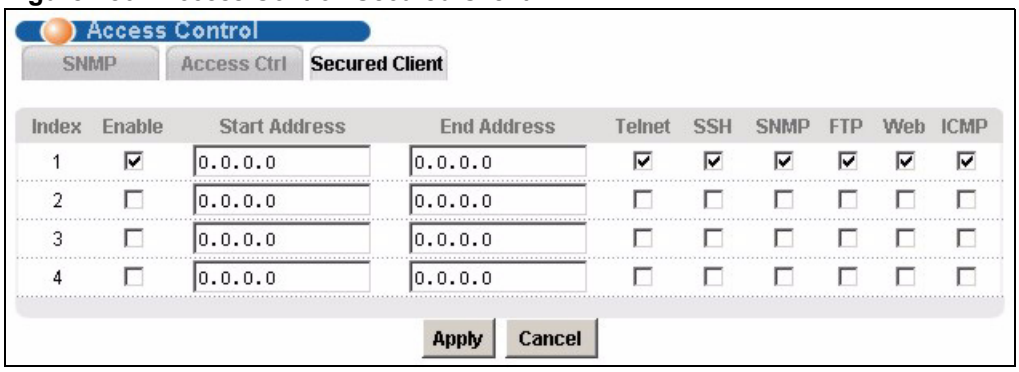
Table 129 Access Control: Service Access Control

LABEL	DESCRIPTION
Services	These are services you may use to access the system are listed here.
Enable	Select the **Enable** check boxes for the corresponding services that you want to allow to access the system.
Service Port	For Telnet, SSH, SNMP, FTP or web services, you can use this field to change the service port number. If you change the port number then you will have to let people (who wish to use the service) know the new port number for that service.
Apply	Click **Apply** to save the changes in this screen to the system's volatile memory. The system loses these changes if it is turned off or loses power, so use the **Config Save** on the navigation panel and then the **Save** button to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to begin configuring this screen afresh.

15.3.1 Secured Client Screen

Click **Sys > Access Control** from the navigation panel and then the **Secured Client** tab to open the following screen. Use this screen to configure IP address ranges of trusted computers that may manage the system.

Figure 180 Access Control: Secured Client



The following table describes the labels in this screen.

Table 130 Access Control: Secured Client

LABEL	DESCRIPTION
Index	This is the client set index number. A "client set" is a group of one or more "trusted computers" from which an administrator may use a service to manage the system.
Enable	Select this check box to activate this secured client set. Clear the check box if you wish to temporarily disable the set without deleting it.
Start Address End Address	Configure the IP address range of trusted computers from which you can manage the system. The system checks if the client IP address of a computer requesting a service or protocol matches the range set here. The system immediately disconnects the session if it does not match.
Telnet/SSH/ SNMP/FTP/Web/ ICMP	Select services that may be used for managing the system from the specified trusted computers.

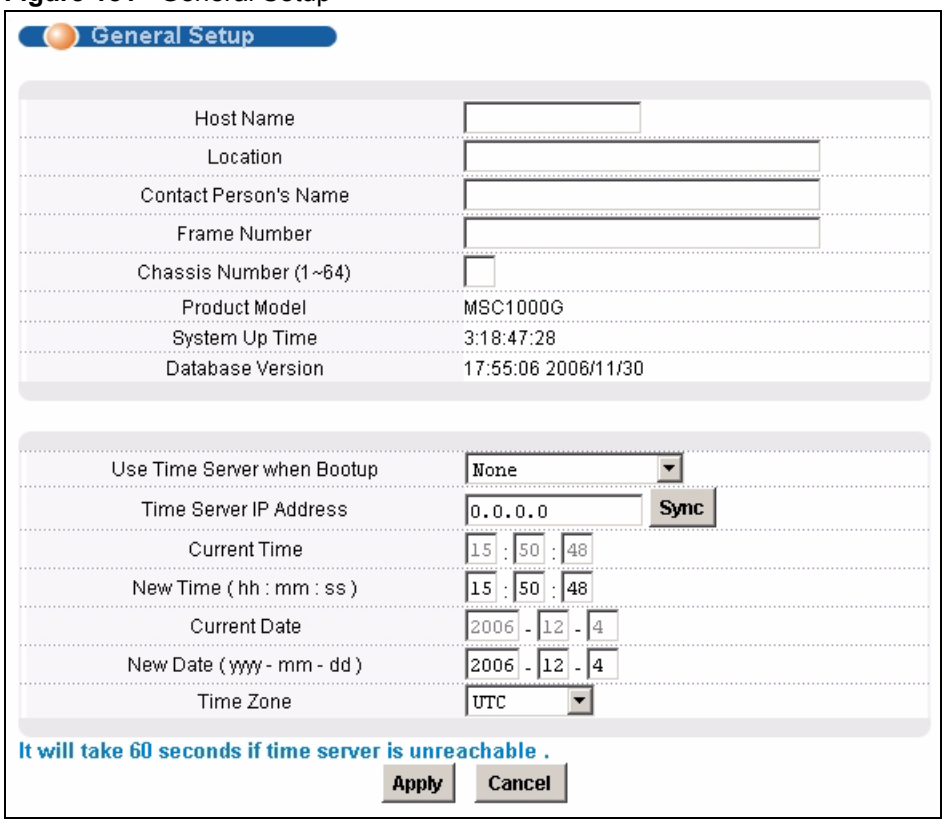
Table 130 Access Control: Secured Client (continued)

LABEL	DESCRIPTION
Apply	Click **Apply** to save the changes in this screen to the system's volatile memory. The system loses these changes if it is turned off or loses power, so use the **Config Save** on the navigation panel and then the **Save** button to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to begin configuring this screen afresh.

15.4 General Setup

Click **Sys > General Setup** from the navigation panel to open the following screen.

Figure 181 General Setup



The following table describes the labels in this screen.

Table 131 General Setup

LABEL	DESCRIPTION
Host Name	Choose a descriptive name for identification purposes. This name consists of up to 31 English keyboard characters; spaces are not allowed.
Location	Enter the geographic location of your system. You can use up to 31 English keyboard characters; spaces are not allowed.
Contact Person's Name	Enter the name of the person in charge of this system. You can use up to 31 English keyboard characters; spaces are not allowed.
Frame Number	Enter the number (an integer from 1 to 65535) of the frame (rack) where the system is installed.

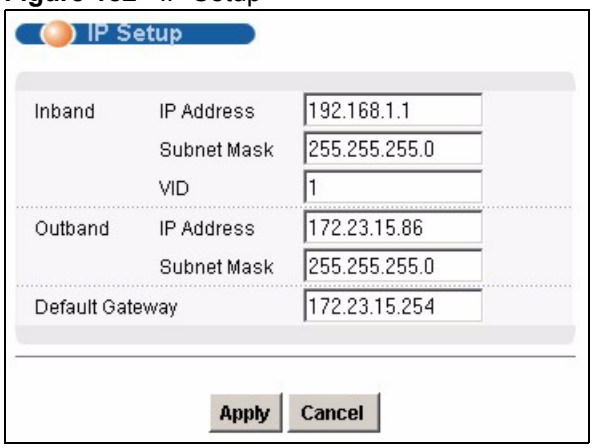
Table 131 General Setup (continued)

LABEL	DESCRIPTION
Chassis Number	Enter a chassis number (an integer from 1 to 64). The chassis number helps to keep track of this individual unit in a multiple unit application.
Product Model	This field displays your device type.
System Up Time	This field shows how long the system has been running since the last time it was started.
Database Version	This field displays the time and date that the system's configuration was last saved to the non-volatile memory. The time is in (24-hour) hour, minute and second format. The date is in year, month and day format.
Use Time Server When Bootup	Enter the time service protocol that a timeserver uses. Not all timeservers support all protocols, so you may have to use trial and error to find a protocol that works. The main differences between them are the time format. When you select the **Daytime (RFC 867)** format, the system displays the day, month, year and time with no time zone adjustment. When you use this format it is recommended that you use a Daytime timeserver within your geographical time zone. **Time (RFC-868)** format displays a 4-byte integer giving the total number of seconds since 1970/1/1 at 0:0:0. **NTP (RFC-1305)** is similar to Time (RFC 868). **None** is the default value. Enter the time manually. Each time you turn on the system, the time and date will be reset to 2000-1-1 0:0.
Time Server IP Address	Enter the IP address (or URL if you configure a domain name server in the IP Setup screen) of your timeserver. The system searches for the timeserver for up to 60 seconds. If you select a timeserver that is unreachable, then this screen will appear locked for 60 seconds. Please wait.
Current Time	This field displays the time you open this menu (or refresh the menu).
New Time (hh:min:ss)	Enter the new time in hour, minute and second format. The new time then appears in the **Current Time** field after you click **Apply**.
Current Date	This field displays the date you open this menu.
New Date (yyyy-mm-dd)	Enter the new date in year, month and day format. The new date then appears in the **Current Date** field after you click **Apply**.
Time Zone	Select the time difference between UTC (Universal Time Coordinated, formerly known as GMT, Greenwich Mean Time) and your time zone from the drop-down list box.
Apply	Click **Apply** to save the changes in this screen to the system's volatile memory. The system loses these changes if it is turned off or loses power, so use the **Config Save** on the navigation panel and then the **Save** button to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to begin configuring this screen afresh.

15.5 IP Setup

Click **Sys > IP Setup** from the navigation panel to open the following screen. Use this screen to configure the system and management IP addresses and subnet masks.

Figure 182 IP Setup



The following table describes the labels in this screen.

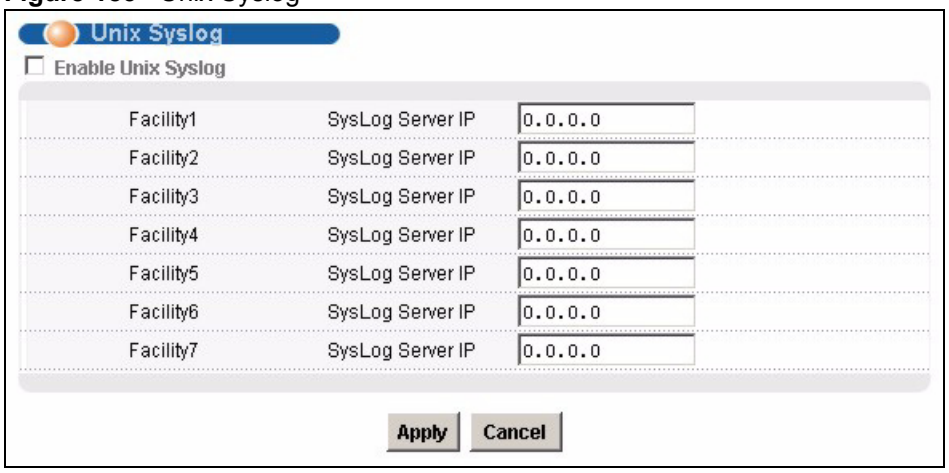
Table 132 IP Setup

LABEL	DESCRIPTION
Inband	These fields configure in-band management settings. In-band management refers to accessing the management interface through a network port (not the management port).
IP Address	Enter the in-band management IP address for the system in dotted decimal notation (for example 1.2.3.4).
IP Mask	Enter the in-band management IP subnet mask for the system in dotted decimal notation for example 255.255.255.0.
VID	Enter the VLAN ID (Identifier) of the management (CPU) VLAN. You must connect to the system through a port that is a member of the management (CPU) VLAN in order to perform in-band management.
Outband	These fields configure out-of-band management settings. Out-of-band management refers to accessing the management interface through a management port.
IP Address	Enter the out-of-band management IP address for the management port in dotted decimal notation (for example 1.2.3.4).
IP Mask	Enter the out-of-band management IP subnet mask for the management port in dotted decimal notation for example 255.255.255.0.
Default Gateway	Enter the IP address of the default outgoing gateway in dotted decimal notation.
Apply	Click **Apply** to save the changes in this screen to the system's volatile memory. The system loses these changes if it is turned off or loses power, so use the **Config Save** on the navigation panel and then the **Save** button to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to begin configuring this screen afresh.

15.6 Syslog Screen

Click **Sys > Unix SysLog** from the navigation panel to open the following screen. The syslog feature sends logs to an external syslog server.

Figure 183 Unix Syslog



The following table describes the labels in this screen.

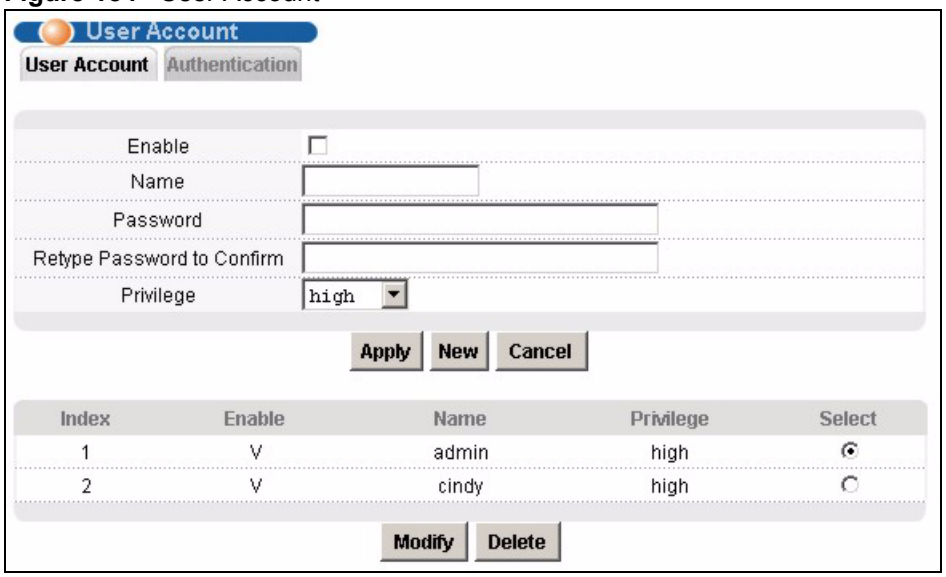
Table 133 Unix Syslog

LABEL	DESCRIPTION
Enable Unix Syslog	Select this check box to activate syslog (system logging) and then configure the syslog parameters described in the following fields.
Facility1~7	The log facility allows you to send logs to different files in the syslog server. Please refer to the documentation of your syslog program for more details.
SysLog Server IP	Enter the IP address of the syslog server for the corresponding log facility.
Apply	Click **Apply** to save the changes in this screen to the system's volatile memory. The system loses these changes if it is turned off or loses power, so use the **Config Save** on the navigation panel and then the **Save** button to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to begin configuring this screen afresh.

15.7 User Account Screen

Click **Sys > User Account** from the navigation panel to open the following screen. Use this screen to manage administrator accounts.

Figure 184 User Account



The following table describes the labels in this screen.

Table 134 User Account

LABEL	DESCRIPTION
Enable	Select this check box to activate the administrator account.
Name	Type a user name for the account
Password	Type a password for the account.
Retype Password to confirm	Type the password again to make sure you have entered it properly.
Privilege	Select the administrator account's level of access privileges. Select **high** to allow the administrator to perform all types of system configuration, including the management of administrator accounts. Select **middle** to allow the administrator to configure the system through the web configurator but not manage administrator accounts. Select **low** to allow the administrator read-only access to the web configurator screens.
Apply	Click **Apply** to save the changes in this screen to the system's volatile memory. The system loses these changes if it is turned off or loses power, so use the **Config Save** on the navigation panel and then the **Save** button to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to begin configuring this screen afresh.
Index	This column numbers the administrator account entries.
Enable	This column displays a "V" if the administrator account is turned on or a "-" if the account is turned off.
Name	This column displays the user names of the accounts.
Privilege	This column displays the level of access privileges of the accounts.
Delete	Select one or more account entries' check boxes and then use the **Delete** button to remove it (or them).

15.8 RADIUS Service Types

When you set the system to authenticate users using an external RADIUS server, the system assigns a privilege level to the login account based on the service type information received from the RADIUS server after the authentication is successful.

The following table shows the service type and privilege level mappings.

Table 135 Service Type to Privilege Level Mapping

SERVICE TYPE	PRIVILEGE LEVEL
login	low
nas-prompt	medium
admin	high

15.9 TACACS+

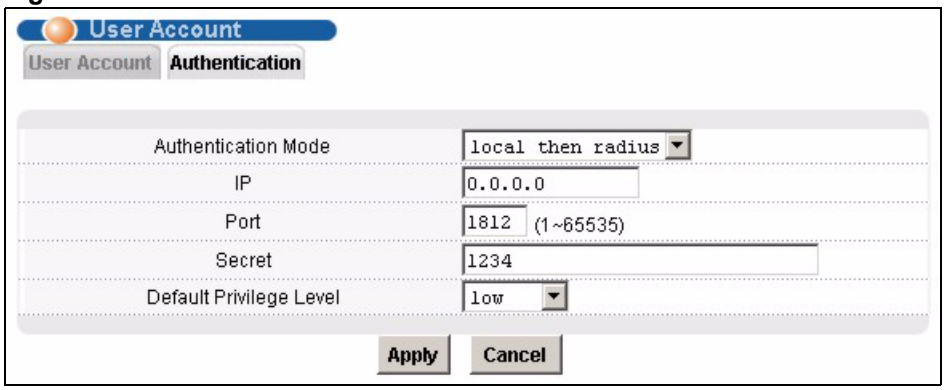
TACACS (Terminal Access Controller Access-Control System) is a security protocol similar to RADIUS. Like RADIUS, TACACS uses a centralized TACACS server that responds to client requests.

TACACS+ is the latest version of TACACS and supports authentication, authorization, and accounting (AAA). Earlier versions only supported authentication or authentication and accounting. TACACS+ connections are more reliable than those earlier TACACS versions due to the use of TCP as the transport protocol for packets. TACACS+ also encrypts the body of traffic traveling between the TACACS+ server and client (although the header is unencrypted).

15.10 User Account Authentication Screen

Click **Sys > User Account** from the navigation panel and then the **Authentication** tab to open the following screen. Use this screen to set up how the system authenticate administrators when they log in.

Figure 185 User Account Authentication



The following table describes the labels in this screen.

Table 136 User Account Authentication

LABEL	DESCRIPTION
Authentication Mode	Use this field to set which database the system uses to authenticate a user. Select **local** to have the system use the internal user account database. Select **radius** to have the system use an external RADIUS server. Select **local first and then radius** to have the system check the internal user account database first, and then the external RADIUS server if there is no match. Select **tacas+** to have the system use an external TACACS+ server. Select **local first and then tacas+** to have the system check the internal user account database first, and then the external TACACS+ server if there is no match.
IP	Type the IP address of the RADIUS server.
Port	Type the RADIUS server's listening port number. The MSC1000G uses the default of 1812 if you do not specify a port.
Secret	Type the password for the RADIUS server.
Default Privilege Level	Specify the default login account privilege level if no service type information is received from the RADIUS server. Select a default privilege level (**low**, **medium** or **high**). Refer to Section 17.5 on page 311 for more information. Select **deny** to block management access to the system. Note: You will be blocked access to the system for remote management if you enter **deny** and the system uses only RADIUS authentication without receiving system type information. In this case, you can only access and manage the device through the console port.
Apply	Click **Apply** to save the changes in this screen to the system's volatile memory. The system loses these changes if it is turned off or loses power, so use the **Config Save** on the navigation panel and then the **Save** button to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to begin configuring this screen afresh.

16

VLAN Screens

16.1 VLAN Introduction

A VLAN (Virtual Local Area Network) allows a physical network to be partitioned into multiple logical networks. Devices on a logical network belong to one group. A device can belong to more than one group. With VLAN, a device cannot directly talk to or hear from devices that are not in the same group(s); the traffic must first go through a router.

In MTU (Multi-Tenant Unit) applications, VLAN is vital in providing isolation and security among the subscribers. When properly configured, VLAN prevents one subscriber from accessing the network resources of another on the same LAN, thus a user will not see the printers and hard disks of another user in the same building. If you have enabled port isolation in the **Switch Setup** screen, you do not need to configure the VLAN to isolate subscribers.

VLAN also increases network performance by limiting broadcasts to a smaller and more manageable logical broadcast domain. In traditional switched environments, all broadcast packets go to each and every individual port. With VLAN, all broadcasts are confined to a specific broadcast domain.

16.2 IEEE 802.1Q Tagged VLAN

The IEEE 802.1Q Tagged VLAN uses both explicit and implicit tagging.

1. Explicit Tagging
   A VLAN identifier is added to the frame header that identifies the source VLAN.
2. Implicit Tagging
   The MAC (Media Access Control) number, the port or other information is used to identify the source of a VLAN frame.

Tagged VLAN uses an explicit tag (VLAN ID) in the MAC header to identify the VLAN membership of a frame across bridges - they are not confined to the switch on which they were created. The VLANs can be created statically by hand or dynamically through GVRP. The VLAN ID associates a frame with a specific VLAN and provides the information that switches need to process the frame across the network. A tagged frame is four bytes longer than an untagged frame and contains two bytes of TPID (Tag Protocol Identifier, residing within the type/length field of the Ethernet frame) and two bytes of TCI (Tag Control Information, starts after the source address field of the Ethernet frame).

The CFI (Canonical Format Indicator) is a single-bit flag, always set to zero for Ethernet switches. If a frame received at an Ethernet port has a CFI set to 1, then that frame should not be forwarded as it is to an untagged port. The remaining twelve bits define the VLAN ID, giving a possible maximum number of 4,096 VLANs. Note that user priority and VLAN ID

are independent of each other. A frame with VID (VLAN Identifier) of null (0) is called a priority frame, meaning that only the priority level is significant and the default VID of the ingress port is given as the VID of the frame. Of the 4096 possible VIDs, a VID of 0 is used to identify priority frames and value 4095 (FFF) is reserved, so the maximum possible VLAN configurations are 4,094.

TPID	User Priority	CFI	VLAN ID
2 Bytes	3 Bits	1 Bit	12 bits

The MSC1000G handles up to 4094 VLANs (VIDs 1-4094). The switch accepts incoming frames with VIDs 1-4094.

16.2.1 Forwarding Tagged and Untagged Frames

Each port on the switch is capable of passing tagged or untagged frames. To forward a frame from an 802.1Q VLAN-aware switch to an 802.1Q VLAN-unaware switch, the switch first decides where to forward the frame and then strips off the VLAN tag. To forward a frame from an 802.1Q VLAN-unaware switch to an 802.1Q VLAN-aware switch, the switch first decides where to forward the frame, and then inserts a VLAN tag reflecting the ingress port's default VID. The default PVID is VLAN 1 for all ports, but this can be changed.

The egress (outgoing) port(s) of a frame is determined on the combination of the destination MAC address and the VID of the frame. For a unicast frame, the egress port based by the destination address must be a member of the VID, also; otherwise, the frame is blocked. A broadcast frame (or a multicast frame for a multicast group that is known by the system) is duplicated only on ports that are members of the VID (except the ingress port itself), thus confining the broadcast to a specific domain.

Whether to tag an outgoing frame depends on the setting of the egress port on an individual VLAN and port basis (remember that a port can belong to multiple VLANs). If the tagging on the egress port is enabled for the VID of a frame, then the frame is transmitted as a tagged frame; otherwise, it is transmitted as an untagged frame.

16.3 Automatic VLAN Registration

GARP and GVRP are the protocols used to automatically register VLAN membership across switches.

16.3.1 GARP

GARP (Generic Attribute Registration Protocol) allows network switches to register and de-register attribute values with other GARP participants within a bridged LAN. GARP is a protocol that provides a generic mechanism for protocols that serve a more specific application, for example, GVRP.

16.3.1.1 GARP Timers

Switches join VLANs by making a declaration. A declaration is made by issuing a Join message using GARP. Declarations are withdrawn by issuing a Leave message. A Leave All message terminates all registrations. GARP timers set declaration timeout values.

16.3.2 GVRP

GVRP (GARP VLAN Registration Protocol) is a registration protocol that defines a way for switches to register necessary VLAN members on ports across the network. Enable this function to permit VLANs groups beyond the local switch.

Please refer to the following table for common IEEE 802.1Q VLAN terminology.

Table 137 IEEE 802.1Q VLAN Terminology

VLAN PARAMETER	Term	Description
VLAN Type	Permanent VLAN	This is a static VLAN created manually.
	Dynamic VLAN	This is a VLAN configured by a GVRP registration/ deregistration process.
VLAN Administrative Control	Registration Fixed	Fixed registration ports are permanent VLAN members.
	Registration Forbidden	Ports with registration forbidden are forbidden to join the specified VLAN.
	Normal Registration	Ports dynamically join a VLAN using GVRP.
VLAN Tag Control	Tagged	Ports belonging to the specified VLAN tag all outgoing frames transmitted.
	Untagged	Ports belonging to the specified don't tag all outgoing frames transmitted.
VLAN Port	Port VID	This is the VLAN ID assigned to untagged frames that this port received.
	Acceptable Frame Type	You may choose to accept both tagged and untagged incoming frames or just tagged incoming frames on a port.
	Ingress Filtering	If set, the switch discards incoming frames for VLANs that do not have this port as a member

16.4 Tagged Frames Forwarding Example

1. First the MSC1000G checks the VLAN ID (VID) of tagged frames or assigns temporary VIDs to untagged frames.
2. The MSC1000G then checks the VID in a frame's tag against the SVLAN table.
3. The MSC1000G notes what the SVLAN table says (that is, the SVLAN tells the MSC1000G whether or not to forward a frame and if the forwarded frames should have a tag).
4. Then the MSC1000G applies the port filter to finish the forwarding decision. This means that frames may be dropped even if the SVLAN says to forward them. Frames might also be dropped if they are sent to a CPE (customer premises equipment) DSL device that does not accept tagged frames.

16.5 Untagged Frames Forwarding Example

1. An untagged frame comes in from the LAN.
2. The MSC1000G checks the PVID table and assigns a temporary VID.

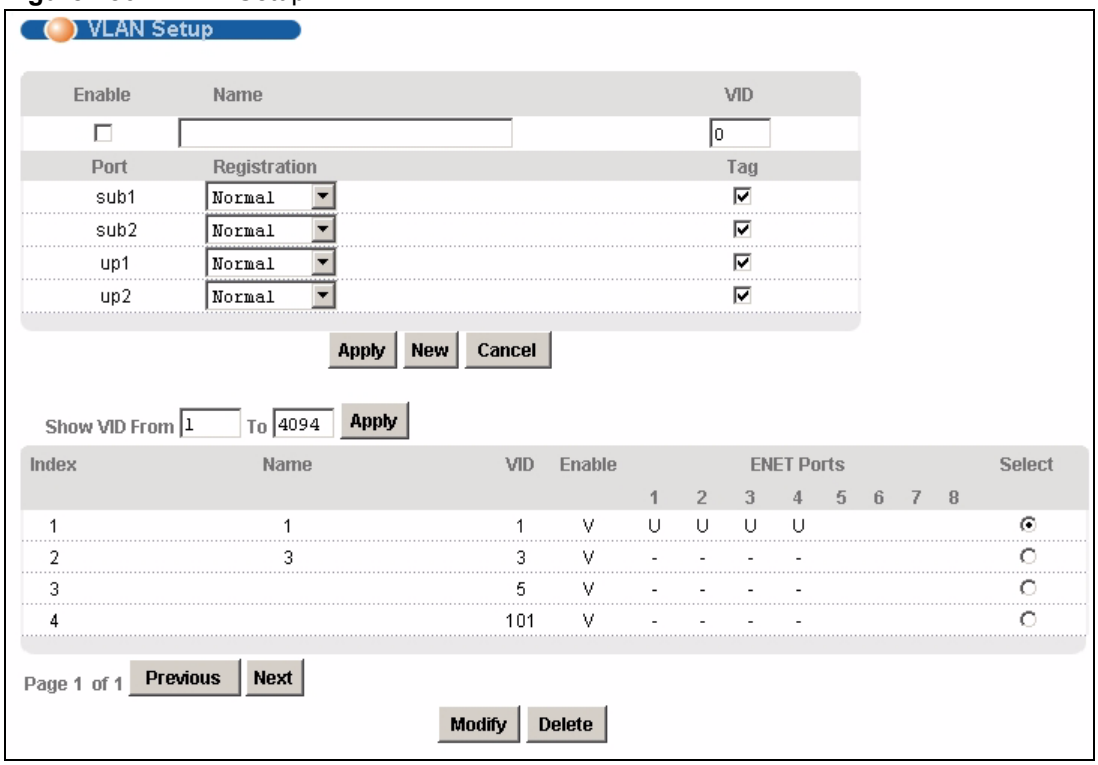
3 The MSC1000G ignores the port from which the frame came, because the MSC1000G does not send a frame to the port from which it came. The MSC1000G also does not forward frames to "forbidden" ports.

4 If after looking at the SVLAN, the MSC1000G does not have any ports to which it will send the frame, it won't check the port filter.

16.6 VLAN Setup Screen

Click **VLAN > VLAN** in the navigation panel to display the screen shown next. You can assign the management switch card's Gigabit Ethernet interfaces to be members of a VLAN group or prohibit an interface from joining a VLAN group in this screen. This is an IEEE 802.1Q VLAN.

Figure 186 VLAN Setup



The following table describes the labels in this screen.

Table 138 VLAN Setup

LABEL	DESCRIPTION
Enable	Select this check box to turn on the VLAN group. You cannot disable a VLAN if any PVIDs are set to use the VLAN or the VLAN is the CPU (management) VLAN.
Name	Enter a descriptive name for this VLAN group for identification purposes.
VID	Enter the VLAN ID (VLAN Identifier) for this static VLAN entry; the valid range is between 1 and 4094.
Port	This is the label of a Gigabit Ethernet interface.

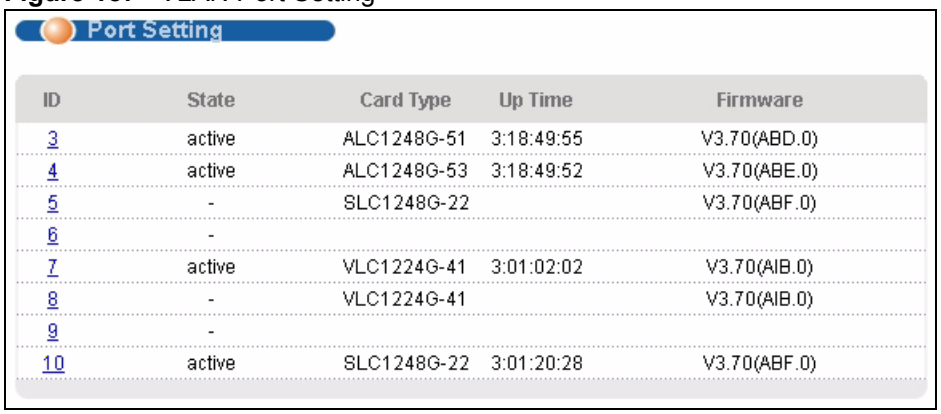
Table 138 VLAN Setup (continued)

LABEL	DESCRIPTION
Registration	Select **Normal** for the port to dynamically join this VLAN group using GVRP. Select **Fix** for the port to be a permanent member of this VLAN group. Select **Forbidden** if you want to prohibit the port from joining this VLAN group. You cannot change a port from the fixed state to another state if the port's PVID is set to this VLAN. The VLAN must have at least one port set to the fixed status if the VLAN is the CPU (management) VLAN.
Tag	Select this check box if you want to tag all frames transmitted though a port with this VLAN group ID.
Apply	Click **Apply** to save the changes in this screen to the system's volatile memory. The system loses these changes if it is turned off or loses power, so use the **Config Save** on the navigation panel and then the **Save** button to save your changes to the non-volatile memory when you are done configuring.
New	Click **New** to start configuring the screen again.
Cancel	Click **Cancel** to start configuring the screen again.
Show VID From	Type a range of VLAN IDs that you want to view and click **Apply** to display them in the table below.
Index	This field displays the number of the VLAN entry in this list.
Name	This field displays the descriptive name for this VLAN group.
VID	This field displays the ID number of the VLAN group. Click the number to edit the VLAN settings.
Enable	This field indicates whether the VLAN settings are enabled (**V**) or disabled (**-**).
ENET Ports	This column displays the VLAN tagging settings of the MSC1000G' Gigabit Ethernet interfaces. ENET port 1 and 2 are subtending ports 1 and 2. ENET port 3 and 4 are uplink ports 1 and 2. ENET ports 5~8 do not apply (and nothing displays). **T** displays if the system is to tag all frames transmitted though the port with this VLAN group ID. **U** displays if the system is not to tag all frames transmitted though the port with this VLAN group ID. An **X** indicates that the port is forbidden (blocked) from joining the static multicast group. An **-** indicates that the port is a normal member and can join the VLAN dynamically.
Page X of X	This identifies which page of information is displayed and the total number of pages of information.
Previous/Next Page	Click one of these buttons to show the preceding/following screen if the information cannot be displayed in one screen.
Modify	Select a VLAN's **Select** radio button and click **Modify** to edit the VLAN.
Delete	Select a VLAN's **Select** radio button and click **Delete** to remove the VLAN.You cannot delete the CPU (management) VLAN.

16.7 VLAN Port Setting Screen

Click **VLAN > Port Setting** in the navigation panel to display the screen shown next. You can select a DSL line card to view the VLAN settings on its ports.

Figure 187 VLAN Port Setting


Port Setting
ID State Card Type Up Time Firmware
3 active ALC1248G-51 3:18:49:55 V3.70(ABD.0)
4 active ALC1248G-53 3:18:49:52 V3.70(ABE.0)
5 - SLC1248G-22 V3.70(ABF.0)
6 -
7 active VLC1224G-41 3:01:02:02 V3.70(AIB.0)
8 - VLC1224G-41 V3.70(AIB.0)
9 -
10 active SLC1248G-22 3:01:20:28 V3.70(ABF.0)

The following table describes the labels in this screen.

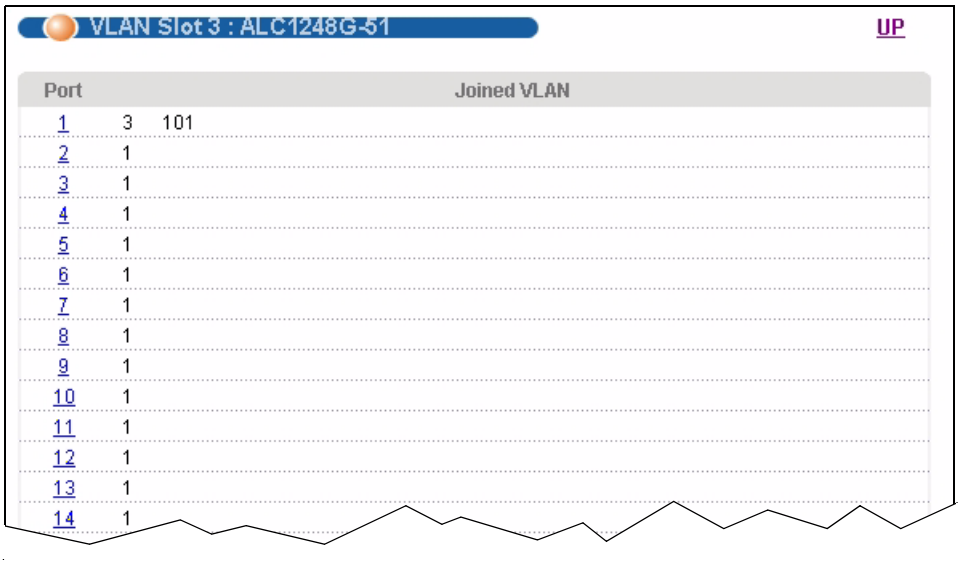
Table 139 VLAN Port Setting

LABEL	DESCRIPTION
ID	This is the slot number of a line card. Click the index number of an active line card to display which of the line card's ports belong to which VLANs.
State	This field displays the line card's current operational status. **active** means the line card is operating normally. **init** means the MSC1000G is initializing the line card. **disable** means a manager has disabled the line card. **inactive** means the line card is starting up or is not operating normally. This could be due to the card starting, a firmware upgrade in progress or a malfunction. See Section 34.6 on page 598 for what to do if the line card stays stuck in the inactive state.
Card Type	This field displays the type of a line card.
Up Time	This field displays how long the line card has been running since the last time it was started.
Firmware	This field displays the current firmware version installed on the line card.

16.8 VLAN Port Setting Slot Screen

Click **VLAN > Port Setting** and then click the ID of an active DSL line card. Use this screen to view the VLAN settings on the DSL line card's ports.

Figure 188 VLAN Port Setting Slot



The following table describes the labels in this screen.

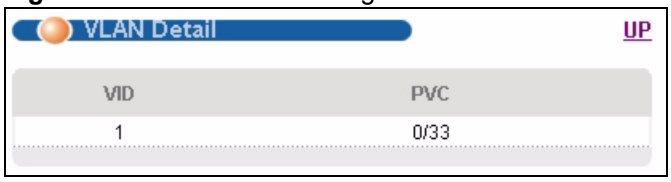
Table 140 VLAN Port Setting Slot

LABEL	DESCRIPTION
Port	This is the label of a DSL port. Click a port's index number to open a details screen about that port.
Joined VLAN	These are the VLAN IDs of all the VLANs to which the DSL port belongs.

16.9 VLAN Port Setting Slot Detail Screen

Click **VLAN > Port Setting** and then click the ID of an active DSL line card. Click the Use this screen to view the VLAN settings on the DSL line card's ports.

Figure 189 VLAN Port Setting Slot Detail



The following table describes the labels in this screen.

Table 141 VLAN Port Setting Slot Detail

LABEL	DESCRIPTION
VID	This column lists the VLAN IDs of all the VLANs to which the DSL port belongs.
PVC	This column list the VPI and VCI that the DSL port uses with each VLAN.

PART III
Commands

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17

Commands

This chapter introduces the Command Line Interface (CLI) and lists the available commands.

See the web configurator chapters of this User's Guide for background information on features configurable by web configurator.

17.1 Commands Introduction

You can use commands to configure the IES-5000.

Telnet to the IES-5000 or connect a computer to the console port on the MSC1000G and use terminal emulation software configured to VT100 terminal emulation, 9600 bps, No parity, 8 data bits, 1 stop bit, and no flow control.

The default user name is "admin" and the default password is "1234".

```
User name: admin

Password: ****
Copyright (c) 1994 - 2006 ZyXEL Communications Corp.
ras>
```

17.2 Command Conventions

The rules of the commands are listed next.

1. The command keywords are in `courier new` font.
2. A command can be abbreviated to the smallest unique string that differentiates it from other commands. For example the `sys date show` command could be abbreviated to `sy d sh`.
3. The optional fields in a command are enclosed in square brackets [], for instance, config [save] means that the save field is optional.
4. "Command" refers to a command used in the command line interface.
5. The | symbol means "or".

Using commands not documented in the user's guide can damage the unit and possibly render it unusable.

17.3 Getting Help

The system includes a help facility to provide you with the following information about the commands:

- List of available commands under a command group.
- Detailed descriptions of the commands.

17.3.1 List of Available Commands

Enter "`help`" or "`?`" to display a list of commands you can use.

```
ras> help
acl             alarm           clear           cluster
config          diagnostic      exit            ip
lcman           multicast       port            profile
show            switch          sys             vlan
```

```
ras> switch ?
bandwidth       bcastctrl       dot3ad          garptimer
isolation       mac             mstp            port
qschedule       queuemap
```

17.3.2 Detailed Command Information

Enter a command followed by "`help`" or "`?`" to display detailed sub commands and parameters.

```
ras> switch port speed ?
usage: speed <giga-port> <speed>
  <giga-port> : sub1|sub2|up1|up2|all if trunking is disabled
                tsub|tup|all if trunking is enabled
  <speed>     : auto|1000F|100F|100H
```

17.4 Common Command Notation

The following table describes commonly used command parameter notation.

Table 142 Common Command Notation

NOTATION	DESCRIPTION
[…]	The optional fields in a command are enclosed in square brackets [], for instance, ip ping <ip> [<count>] means that the count field is optional.
|	The | symbol means “or”.
sub1	This represents subtending port 1. On the MSC’s front panel this is SFP slot 1.
sub2	This represents subtending port 2. On the MSC’s front panel this is SFP slot 2.
up1	This represents uplink port 1. On the MSC’s front panel this is Gigabit interface 3 (a Gigabit Ethernet port/SFP slot pair).
up2	This represents uplink port 2. On the MSC’s front panel this is Gigabit interface 4 (a Gigabit Ethernet port/SFP slot pair).
<giga-port>	This represents the Gigabit Ethernet uplink port(s) or subtending port(s) or both.
<index>	This is an integer that sets the index number of a table entry. The range starts at 1. The end of the range varies by command.
<ip>	This represents a valid IP version four address in dotted decimal notation. 192.168.1.1 is an example.
<mac>	This represents a MAC address in "a0:c5:12:34:56:78" format.
</netmask>	This represents the bit number of the subnet mask of an IP address. The range is 0 to 32. To find the bit number, convert the subnet mask to binary and add all of the 1’s together. Take “255.255.255.0” for example. 255 converts to eight 1’s in binary. There are three 255’s, so add three eights together and you get the bit number (24).
<port>	This represents the UDP or TCP port number of a service.
<slot>	This represents the number of an individual chassis slot where a DSL line card is located.
<slot-port>	This represents the number of an individual chassis slot where a DSL line card is located and the number of a DSL port(s). You can specify a single port <1>, all ports <*> or a list of ports <1,3,4>. You can also include a range of ports <1,5,6~10,11,12>.
<vid>	This represents a VLAN identifier (VLAN ID). The range is [1.. 4094].
<vpi/vci>	The VPI (Virtual Path Indicator) and VCI (Virtual Channel Indicator) of an individual PVC (Permanent Virtual Circuit). The VPI setting can be 0 to 255. The VCI setting can be 32 to 65535 if the VPI is 0 or 1 to 65535 if the VPI is not 0.

17.5 Command Privilege Levels

There is a high, medium or low privilege level for each command.

High privilege commands are only available to administrators with high privilege access. High privilege commands include things like creating administrator accounts, restarting the system and resetting the factory defaults. Administrators with high privilege access can use all commands including the lower privilege commands.

Administrators with middle privilege access can use middle or low privilege commands. Middle privilege commands include things like general feature configuration.

Administrators with the low privilege level are restricted to using only low privilege commands. Low privilege commands are read only and consist of displaying feature settings or configuration.

17.6 Saving Your Configuration

Use the following command to save your configuration when you are done with a configuration session.

```
ras> config save
```

Do not turn off your MSC1000G while saving your configuration.

This command saves all system configurations to nonvolatile memory. You must use this command to save any configuration changes that you make, otherwise the MSC1000G returns to its last saved settings when it is restarted. Save your changes after each configuration session.

Nonvolatile memory refers to the MSC1000G's storage that remains even if the MSC1000G's power is turned off. Configuration changes saved in the volatile (run time) memory are lost when the MSC1000G is turned off.

17.7 Commands Summary

The following tables list the commands that you can use with the MSC1000G. The **P** column on the right indicates the administrator privilege level needed to use the command (**H** for high, **M** for middle or **L** for low).

17.7.1 acl Commands

These are the Access Control List management commands.

Table 143 acl Commands

COMMAND				DESCRIPTION	P
acl					
	dhcprelay82	clearinfo	<vid>	Removes option 82 information for the specified VLAN.	M
		delete	<vid>	Deletes the option 82 information entry for the specified VLAN.	M
		disable	<vid>	Deactivates option 82 for the specified VLAN.	M

Table 143 acl Commands (continued)

COMMAND				DESCRIPTION	P
		enable	<vid> <mode>	Enables option 82 information for the specified VLAN. <mode> = 1 or 2 1: Enable DHCP relay and option82. 2: Disable DHCP relay but enable option82.	M
		info	<vid> <string>	Sets information for the option 82 Circuit ID field.	M
		relaymode	<vid> [auto|both]	Sets which DHCP relay mode the system uses for the specified VLAN. auto = send the requests to the active DHCP server first. If the active DHCP server does not respond, the switch sends the DHCP request to the backup DHCP server. both = send the requests to both the active and backup DHCP servers.	M
		server	active <vid> <1|2>	Sets the active DHCP server to which the DHCP requests are sent first. <vid> = a VLAN ID to be served with DHCP relay. 1 = Sets the first DHCP server as the active server. 2 = Sets the second DHCP server as the active server. The default is 1.	M
			set <vid> <serverip1> [serverip2]	Sets an entry for forwarding DHCP requests to the DHCP servers at the specified IP addresses. <vid> = a VLAN ID to be served with DHCP relay.	M
			delete <vid> [serverip]	Removes an entry for forwarding DHCP requests to the DHCP server at the specified IP address.	M
		set	<vid>	Creates an option 82 entry for the VLAN.	M
		show		Displays DHCP relay and option 82 settings.	L
		suboption2	enable <vid>	Turns on option 82 sub-option 2.	M
			disable <vid>	Turns off option 82 sub-option 2.	M
			set <vid> <info>	Adds the specified information for sub-option 2.	M
	dhcpsnoop			DHCP snooping allows the system to identify and block packets from devices using unknown/static IP addresses.	

Table 143 acl Commands (continued)

COMMAND				DESCRIPTION	P
		disable	<slot-port>	Deactivates DHCP snooping on the specified subscriber port(s).	M
		enable	<slot-port>	Activates DHCP snooping on the specified subscriber port(s).	M
		flush	<slot-port>	Clears the DHCP snooping table on the specified port(s).	M
		pool	delete <slot-port> <ip>	Removes the static IP address from the DHCP snooping table.	M
			set <slot-port> <ip>	Adds a static IP address to the DHCP snooping table. You can add up to 3 static IP addresses per port.	M
		show	<slot>|<slot-port>	Displays the DHCP snooping table on the specified port.	L
	dot1x			IEEE 802.1x authentication.	
		disable		Turns off IEEE 802.1x.	M
		enable		Turns on IEEE 802.1x.	M
		port	control <slot-port> auto|auth|unauth	Sets the IEEE 802.1x port authentication option for specific subscriber ports. auto = authentication required auth = forced authentication unauth = forced no authentication	M
			disable <slot-port>	Turns off IEEE 802.1x for specific subscriber ports.	M
			enable <slot-port>	Turns on IEEE 802.1x for specific subscriber ports.	M
			period <slot-port> <secs>	Sets the IEEE 802.1x re-authentication period (60~65535) for specific subscriber ports.	M
			reauth <slot-port> on|off	Sets the IEEE 802.1x re-authentication option for specific subscriber ports.	M
			show <slot>	Displays IEEE 802.1x settings.	L
		radius	ip <index> <ip>	Sets the IP address of the specified external RADIUS server (1 or 2).	M
			port <index> <port>	Sets the external RADIUS server port number of the specified RADIUS server.	M
			secret <index> <secret_key>	Sets the authentication and encryption key of the specified RADIUS server.	M
		show		Displays the external RADIUS server settings.	L

Table 143 acl Commands (continued)

COMMAND				DESCRIPTION	P
	dsbcast	enable	<slot-port> <vid>	Turns on the blocking of downstream broadcast packets from going to the specified VLAN on the specified port.	M
		disable	<slot-port> <vid>	Turns off the blocking of downstream broadcast packets to go to the specified VLAN on the specified port.	M
		show	<slot>|<slot-port>	Displays the settings for blocking downstream broadcast packets for the specified slot or port.	M
	maccount			MAC count limits the number of MAC addresses that can connect to a subscriber port.	
		disable	<slot-port>	Turns off MAC count limiting on the specified subscriber ports.	M
		enable	<slot-port>	Turns on MAC count limiting on the specified subscriber ports.	M
		set	<slot-port> <count>	Sets the MAC count limit number (1-128) on the specified subscriber ports.	M
		show	<slot>	Displays MAC count limiting settings.	L
	macfilter			MAC filter allows only traffic from specified source MAC addresses on the specified subscriber ports.	M
		delete	<slot-port> <mac>	Removes a MAC filter MAC address entry.	M
		disable	<slot-port>	Turns off the MAC filter on the specified subscriber ports.	M
		enable	<slot-port>	Turns on the MAC filter on the specified subscriber ports.	M
		mode	<slot-port> <accept|deny>	Sets the MAC filter actions.	M
		set	<slot-port> <mac>	Adds a MAC filter MAC address entry.	M
		show	<slot>|<slot-port>	Displays MAC filter settings.	L
	ouifilter			MAC OUI (Organization Unit Identifier) filter allows or drops packets with MAC addresses from specific vendors.	
		delete	<slot-port> <mac>	Removes the static MAC OUI filter. <mac> = first three octets of the MAC address.	M
		disable	<slot-port>	Deactivates MAC OUI filtering on this port.	M
		enable	<slot-port>	Activates MAC OUI filtering on this port.	M

Table 143 acl Commands (continued)

COMMAND				DESCRIPTION	P
		mode	<slot-port> <accept|deny>	Sets the filter action.	M
		set	<slot-port> <mac>	Creates a MAC OUI filter. <mac> = first three octets of the MAC address.	M
		show	<slot>|<slot-port>	Displays MAC OUI filter settings for the specified port or slot.	L
	pktfilter			Packet type filter allows or drops specified packet types on the specified subscriber ports.	
		set	<slot-port> <type>	Sets the packet type filter for the specified subscriber ports. <type> = accept-all, pppoe-only, or any combination of ip, arp, dhcp, eapol, pppoe, netbios, igmp separated by a space.	M
		show	<slot>	Displays packet type filter settings.	L
	pppoeagent	clearinfo	<vid>	Resets PPPoE line description for the VLAN.	M
		enable	<vid>	Enables PPPoE line information for the VLAN. The switch adds the line information to PPPoE packets for identification and security.	M
		delete	<vid>	Deletes PPPoE line information settings.	M
		disable	<vid>	Deactivate PPPoE line information insertion.	M
		info	<vid> <description>	Sets PPPoE line information. Enter a description (up to 24 characters).	M
		set	<vid>	Creates a PPPoE agent entry for the VLAN.	M
		show		Displays PPPoE line information settings.	L
	rule			Upstream access control rules allows you to apply profiles on the subscriber line PVC.	
		delete	<slot-port-vpi/vci> <profile>	Removes the ACL profile.	M
		set	<slot-port-vpi/vci> <profile>	Applies the ACL profile. You can apply up to 8 profiles to a PVC.	M
		show	<slot-port-vpi/vci>	Displays ACL profile settings for a PVC.	L

17.7.2 alarm Commands

These are the alarm management commands.

Table 144 alarm Commands

COMMAND				DESCRIPTION	P
alarm				Alarm command general parameters: <alarm> = alarm category (eqpt, dsl, enet, sys or all) <severity> = alarm severity level (critical, major, minor, info or all) <condition> = Specify an alarm condition.	
	clear			Erases historic alarm entries.	M
	cutoff			Cancels an alarm. This stops the sending of the alarm signal current.	M
	edit	<alarm>|all <fac> <target>[,<target>]		Edits an alarm report entry. <fac> = local1~local7 <target> = snmp|syslog|all|none 'none' disables alarm reports on this alarm category.	M
	xedit	<alarm> <cond> <severity> <fac> <target>[,<target>] <clearable>		Sets the severity level of an alarm(s) and where the system is to send the alarm(s). <cond> = <condition>|<code>|all <target> = snmp|syslog|all|none 'none' disables alarm reports on this alarm category. <clearable> = clearable|unclearable	M
	history	clear	<alarm>|all <condition>|all	Removes historic alarm entries by alarm category and alarm condition or by severity.	M
		clear	<severity>		
		show	[<severity>|all] [<alarm>|all] [<condition>|all] [<sdate>|all] [<edate>|all] [for|rev] [detail]	Displays historic alarms by severity, alarm category and alarm condition. You can also display detailed alarms.	L
	port	show	<slot>	Displays port alarm severity level thresholds.	L
		set	<all|sub1|sub2|up1|up2|mgmt|slot-port> <severity>	Sets the severity of alarms to record for individual ports.	M

Table 144 alarm Commands (continued)

COMMAND				DESCRIPTION	P
	show	[<severity>|all] [<alarm>|all] [<condition>|all] [<sdate>|all] [<edate>|all] [for|rev] [detail]		Displays current alarms by severity, alarm category or alarm condition. You can also display detailed alarms.	L
	tablelist	[<alarm>|all] [<severity>|all] [<fac>|all] [<target>[,<target>]] [<condition>|all]		Displays the supported alarm list and report settings. <fac> = local1~local7 <target> = snmp|syslog|all	L

17.7.3 clear Commands

These are the commands to reset the counters.

Table 145 clear Commands

COMMAND				DESCRIPTION	P
clear					
	atm	<slot-port>|<slot-port-vpi/vci>		Resets ATM counters on the specified port or PVC.	M
	dhcp	counter <slot-port>		Resets DHCP counters.	M
	enet	<giga-port>|<slot>		Resets counters on the Ethernet port.	M
	igmp	info		Resets IGMP counters and the number of learned IGMP groups.	M
		port info	<slot-port>	Resets the counter of IGMP packets received and the number of learned groups on a port.	M
	ip	inband|outband|both		Resets management counters.	M
	lineperf	<slot-port>		Resets subscriber line performance counters.	M
	packet	<slot-port>|<slot-port-vpi/vci>		Resets the packet transmission counters on a subscriber port or PVC.	M
	paepvc	counter	<slot-port>|<slot-port-vpi/vci>	Resets the PAE PVC counters.	M
	performance	<slot-port> curr|15min|1day		Resets subscriber line performance counters.	M

17.7.4 cluster Commands

These are the commands to configure cluster management.

Table 146 cluster Commands

COMMAND				DESCRIPTION	P
cluster					
	disable			Disable clustering, default is disabled	M
	enable	manager <name>		Enable device as cluster manager	M
		member <password>		Enable device as cluster member	M
	login	<id>		Login into a client	M
	member	candidate	show	List all available candidates	M
			flush	Flush current candidates	M
		delete	<id>	Removes a member from a cluster.	M
		set	<id> <mac> <password>	Adds a member to the cluster.	M
		show		Displays cluster member settings.	L
	show			Displays the cluster member status.	L
	vlan	<vid>		Sets the cluster VLAN ID.	M

17.7.5 config Commands

These are the configuration file management commands.

Table 147 config Commands

COMMAND				DESCRIPTION	P
config					
	default			Resets factory default configuration.	H
	save			Saves current configuration to non-volatile memory.	M
	show	sys|ip|switch|port|profile|acl|vlan|multicast|all [nopause]		Displays the current configuration.	L

17.7.6 diagnostic Commands

These commands allow you to execute a specified diagnostic or test function to an interface port or a subscriber port.

Table 148 diagnostic Commands

COMMAND				DESCRIPTION	P
diagnostic					
	ldm			A Loop Diagnostic Mode test provides details about the condition of an ADSL line. This feature is applicable for ALC line cards only.	
		show	<slot-port> result|hlin|hlog|qln|snr	Displays the most recent loop diagnostic mode test results for the specified subscriber port.	M
		test	<slot-port>	Sets the specified subscriber port to loop diagnostic mode and displays the results.	M
	loopback	f5	<slot-port-vpi/vci>	Performs an OAMF5 loopback test on the specified subscriber port or PVC.	M
	selt	test	<slot-port>	This feature is applicable for ALC line cards only. Single End Loop Test (SELT) checks the distance to the subscriber's location. Note: The port must have an open loop. There cannot be a DSL device, phone, fax machine or other device connected to the subscriber's end of the telephone line. Starts SELT on the port.	M
		show	<slot-port>	Displays the SELT result (such as line type and loop length).	M

17.7.7 ip Commands

The ip commands configure management interface IP settings.

Table 149 ip Commands

COMMAND				DESCRIPTION	P
ip					
	arp	flush		Clears the device's IP Address Resolution Protocol table.	M
		show		Displays the device's IP Address Resolution Protocol table.	L
	gateway	<ip>		Sets the default gateway IP address.	M
	ping	<ip> [<count>]		Pings a host (default 3 times) <count> = number of pings.	L

Table 149 ip Commands (continued)

COMMAND				DESCRIPTION	P
	route	delete	<dst-ip>[/<netmask>] <gateway>	Removes a routing table entry.	M
		set	<dst-ip>[/<netmask>] <gateway-ip> [<metric>] [<name>]	Adds or modifies a route entry. <gateway-ip> = a gateway IP address of '0.0.0.0/0' means a default gateway.	M
		show		Displays the routing table.	L
	show			Displays the IP addresses of the in-band and out-of-band management interfaces and the default gateway, as well as the in-band management VLAN ID.	L
	set	inband|outband <ip>[/<netmask>] [<inband-vid>]		Sets the management IP address, subnet mask and in-band management VLAN ID. <ip> = '0.0.0.0' disables a management interface.	M
	tracert	<ip>		Sends a traceroute packet to the IP address (in the field to the left) and uses the response to determine the path a packet takes to that IP address.	L

17.7.8 lcman Commands

These are the line card management commands.

Table 150 lcman Commands

COMMAND				DESCRIPTION	P
lcman					
	disable	<slot>		Turns off the specified line card.	H
	enable	<slot>		Turns on the specified line card.	H
	reset	<slot>		Performs a hardware reset on the specified line card.	H
	show	[<slot>]		Displays information about the installed cards.	L

17.7.9 multicast Commands

The multicast commands allow you to perform static and dynamic multicast group management.

Table 151 multicast Commands

COMMAND				DESCRIPTION	P
multicast					
	bandwidth	default	<bandwidth>	Sets the default bandwidth (between 1 and 100 000 kbps) allowed for multicast channel(s) for which you have not set the bandwidth settings.	M

Table 151 multicast Commands (continued)

COMMAND				DESCRIPTION	P
		delete	<index>	Removes the specified multicast bandwidth configuration.	M
		port	disable <slot-port>	Deactivates multicast bandwidth setting on a port.	M
			enable <slot-port>	Activates multicast bandwidth setting on a port.	M
			set <slot-port> <bandwidth>	Sets the maximum multicast bandwidth allowed on a port.	M
			show <slot>|<slot-port>	Displays multicast bandwidth settings on the specified line card or port.	L
		set	<index> <start-mcast-ip> <end-mcast-ip> <bandwidth>	Sets bandwidth allowed for the specified multicast channel(s).	M
		show		Displays multicast bandwidth settings on the device.	L
	igmp	disable		Turns off IGMP proxy or snooping.	M
		enable	proxy|snooping [v2|v3]	Turns on IGMP proxy or snooping using the specified version.	M
		qryvid	delete	Removes an IGMP query VLAN ID.	M
			set <vid>	Adds an IGMP query VLAN ID.	M
			show	Displays the IGMP query VLAN IDs.	L
		show		Displays the IGMP mode (proxy, snooping or disabled) and version (v2 or v3).	M
	igmpcount	disable	<slot-port>	Turns off the IGMP count limit for a DSL port(s).	M
		enable	<slot-port>	Turns on the IGMP count limit for a DSL port(s).	M
		set	<slot-port> <count>	Sets the IGMP count limit for a DSL port(s).	M
		show	<slot>	Displays the IGMP count limit setting status for the specified slot.	L
	igmpfilter	set	<slot-port> <igmpfilter>	Sets a DSL port(s) to use an IGMP filter profile.	M
		show	<slot>	Displays multicast group configuration and dynamic group member status.	L
	mvlan	delete	<vid>	Removes a multicast VLAN.	M
		disable	<vid>	Deactivates a multicast VLAN.	M
		enable	<vid>	Activates a multicast VLAN.	M
		group	delete <vid> <index>	Removes a multicast VLAN group.	M

Table 151 multicast Commands (continued)

COMMAND				DESCRIPTION	P
			set <vid> <index> <start-mcast-ip> <end-mcast-ip>	Sets a multicast VLAN group.	M
		name	<name>	Sets the name of the multicast VLAN setting.	M
		set	<vid> <slot-port> fix|forbid	Sets the port multicast group membership settings.	M
		show	<vid>	Displays multicast VLAN settings.	L
	smcast	delete	<vid> <group-ip>	Removes a static multicast group entry.	M
		set	<vid> <group-ip> all|sub<#>|up<#>|tsub|tup|<slot-port> fix|forbid|normal	Configures a static multicast group entry.	M
		show		Displays the static multicast group configuration.	L

17.7.10 port Commands

The `port` commands allow you to configure the subscriber DSL ports.

Table 152 port Commands

COMMAND				DESCRIPTION	P
port					
	adsl			ADSL port specific commands	
		alarmprof	<slot-port> <alarmprofile>	Applies an ADSL alarm profile to the subscriber port.	M
		annexl	disable <slot-port>	Turns off the Annex L reach extended feature.	M
			enable <slot-port> [narrow]	Turns on the Annex L reach extended feature. If the ‘narrow’ is not entered then Annex L mode will be enabled as ‘wide’ PSD mode.	M
		annexm	disable <slot-port>	Turns off the Annex M double upstream feature.	M
			enable <slot-port>	Turns on the Annex M double upstream feature (upstream tones from 6 to 63).	M
		annexi	disable <slot-port>	Turns off the Annex I all digital mode feature.	M
			enable <slot-port>	Turns on the Annex I all digital mode feature.	M

Table 152 port Commands (continued)

COMMAND				DESCRIPTION	P
		dscarrier0	<slot-port> <m1> <m2> <m3> <m4> <m5> <m6> <m7>	Disables downstream carrier tones from 33 to 255. <m1>~<m7> = carrier tones, 0~ffffffff, '1' disables the corresponding tone.	M
		dscarrier1	<slot-port> <m1> <m2> <m3> <m4> <m5> <m6> <m7>	Disables downstream carrier tones from 256 to 511. <m1>~<m7> = carrier tones, 0~ffffffff, '1' disables the corresponding tone.	M
		inpmin	<slot-port> <us_inp> <ds_inp>	Sets the upstream (us) and downstream (ds) Impulse Noise Protection minimum setting (0~6).	M
		optionmask	<slot-port> <option_mask>	Sets the following attributes. 0x0001= disable Trellis 0x0002 = disable Reed-Solomon 0x0004 = disable upstream bitswap 0x0008 = disable downstream bitswap 0x0010 = disable 1-bit constellation 0x0020 = disable transmit windowing (ADSL2+ only) 0x0040 = disable s=0.5 support (G.dmt only) 0x0080 = disable G.lite rate limit (G.lite only)	M
		pmm	disable <slot-port>	Turns off power management mode.	M
			enable <slot-port> [L2|L3]	Turns on power management mode. L2 = power management mode L2 L3 = power management mode L2 and L3	M
			param <slot-port> [l0time <l0time>] [l2time <l2time>] [l2pcb <l2atpr> <l2atprt>] [l2rate <l2minrate> <l2maxrate> <l2threshold>]	Sets the L0 (full power) and L2 (low power) power mode transition settings. <l0time> = Time (10 ~ 65535 seconds) to stay in L0 mode. <l2time> = Time (10 ~ 65535 seconds) to wait before performing another power trims in L2 mode. <l2atpr> = Maximum aggregated power reduction (APTR) per trim in dB (0 ~ l2atprt). <l2atprt> = Maximum total aggregate power reduction in dB (0-15). <l2minrate> = Minimum rate in L2 (32 ~ 4096). <l2maxrate> = Maximum rate in L2 (minimum L2 rate ~ maximum upstream rate in kbps). <l2threshold> = Line rate threshold to stay in L2 mode. When the rate is not within the threshold, the port switches to L0 mode immediately.	M

Table 152 port Commands (continued)

COMMAND				DESCRIPTION	P
		power	<slot-port> fix|power|rate <max_us_tx> <max_ds_tx> <max_rx>	Specifies the maximum allowed transmit power and maximum aggregate received power. fix|power|rate = PSD and power adaptivity fix = fixed mode power = priority to power rate = priority to rate <max_us_tx> = maximum upstream transmit power, -130~200 in 0.1 dBm. <max_ds_tx> = maximum downstream transmit power, -50~200 in 0.1 dBm. <max_rx> = maximum aggregate receive power at atu-c, -255~255 in 0.1 dBm.	M
		psd	maximum [<slot-port> <us-psd> <ds-psd>]	Sets/displays maximum upstream/ downstream nominal PSD values. This is for testing purposes. <us-psd> = Upstream PSD (-400 ~ 40 in 0.1dBm/Hz). <ds-psd> = Downstream PSD (-400 ~ 40 in 0.1dBm/Hz).	M
		set	<slot-port> <profile> <mode>	Sets ADSL port(s) to use a profile created by the profile adsl set command. <mode> = for Annex A, gdmt, t1413, glite, auto, adsl2, adsl2+; for Annex B, gdmt, etsi, auto, adsl2, adsl2+	M
		uscarrier	<slot-port> <m0> <m1>	Disables upstream carrier tones from 0 to 63. <m0>, <m1> = carrier tones, 0~ffffffff, '1' disables the corresponding tone.	M
	copy	<source> <destination>		Copies port settings from a source port to destination ports on the same type of line card.	M
	disable	<slot-port>		Turns off a subscriber port.	M
	enable	<slot-port>		Turns on a subscriber port.	M
	ipbpvc	arpproxy	flush all |edgerouter [<ip> <vid>] |interface [<ip/mask> <vid>]	Manually flush the learned MAC addresses from the ARP table.	M
			age set <sec>	Sets the valid time interval for learned MAC addresses in the ARP table. 10..10000 seconds	M
			show	Displays the number of seconds a learned MAC address remains valid in the ARP table.	M
		delete	<slot-port-vpi/ vci>	Remove the specified IP aware Bridge PVC.	M
		domain	delete <domain-name>	Removes the specified domain. First delete all VLANs belonging to this domain.	M

Table 152 port Commands (continued)

COMMAND				DESCRIPTION	P
			dhcpvlan disable <domain name>	Disable DHCP VLAN in a domain	M
			dhcpvlan enable <domain name> <vid>	Enable DHCP VLAN in a domain	M
			set <domain name>	Create domain, maximum **8** domains in the system.	M
			show[<domain name>]	Display domain setting	L
			vlan <domain name> <vid> <registration>	Set vlan to join or leave specified domain, maximum **8** VLANs in one domain.	M
		edgerouter	delete <ip> <vid>	Delete specified edge router setting	M
			set <ip>/<mask> <vid>	Sets the edge router	M
			show [<vid>]	Displays the edge router setting.	L
		interface	delete <ip>/<mask> <vid>	Delete an IP interface.	M
			set <ip>/<mask> <vid> [<slot-port-vpi/vci>]	Sets the interface.	M
			show all|<ip/mask>|<vid>|<ip/mask> <vid>	Displays the interface setting by optional <ip>/<mask> and vlan id parameter	L
		route	delete <domain-name> <ip/mask> <nexthop>	Deletes route entry from specified domain	M
			set <domain-name> <ip/mask> <nexthop> <metric> [<priority>]	Sets a new route to specified edge router for a given domain. Maximum **16** routes in a domain.	M
			show [<domain name> | <ip/mask> | <domain> <ip/mask>]	Displays current routing table for specific domain.	L
		set	<slot-port-vpi/vci> <profile> <vid> <priority> <type>	Sets IP aware Bridge PVC.	M
		show	<slot>|<slot-port>|<slot-port-vpi/vci>	Displays IP aware Bridge PVC settings.	L
		vlan	<slot-port-vpi/vci> <vid> <registration> <tag>	Sets VLAN attributes of a PVC.	M
	name	<slot-port> <name>		Sets a name for a subscriber port.	M

Table 152 port Commands (continued)

COMMAND				DESCRIPTION	P
	paepvc			Commands for configuring and displaying PPPoA-to-PPPoE (PAE) PVC settings.	
		delete	<slot-port-vpi/vci>	Removes a PAE PVC.	M
		set	<slot-port-vpi/vci> <profile> <mux> <pvid> <priority> [acname <acname>] [srvcname <srvcname>] [hellotime <hellotime>]	Configures a PVC for PAE translation. <mux> = Encapsulation type (llc or vcmux). <acname> = Host name of the access concentrator. <srvcname> = Descriptive name for the service that uses this PVC. <hellotime> = Timeout (0-600 seconds) for PPPoE session. Note: Make sure the VID is not already used for MVLAN or TLS PVC.	M
		show	<slot>|<slot-port>|<slot-port-vpi/vci>	Displays the PAE PVC settings for the specified port and/or slot.	L
	ppvc			Priority PVC channel commands.	
		delete	<slot-port-vpi/vci>	Removes a priority-based PVC.	M
		member	delete <slot-port-vpi/vci> <vpi/vci>	Removes a PVC channel from a PVC group.	M
			set <slot-port-vpi/vci> <vpi/vci> <atmprofile> <level>	Adds a priority-PVC into the group.	M
		set	<slot-port-vpi/vci> <mux> <pvid> <priority>	Creates a priority-based PVC. <mux> = encapsulation: llc, vcmux <pvid> = default VLAN ID, 1~4094 <priority> = default priority, 0~7	M
		show	<slot>|<slot-port>|<slot-port-vpi/vci> [detail]	Displays runtime configured virtual channels.	L
		vlan	<slot-port-vpi/vci> <vid> <registration> <tag>	Adds a PVC channel to a VLAN. <registration> = join or leave <tag> = TX tagging, tag or untag	M
	pvc			Permanent Virtual Circuit channel specific commands.	
		delete	<slot-port-vpi/vci>	Removes a PVC setting.	M
		mvlan	disable <slot-port-vpi/vci>	Deactivates multicast VLAN on the PVC.	M
			enable <slot-port-vpi/vci>	Activates the multicast VLAN in the PVC.	M

Table 152 port Commands (continued)

COMMAND				DESCRIPTION	P
		set	<slot-port-vpi/vci> <profile> <mux> <pvid> <priority>	Creates or modifies a PVC setting. <profile> = ATM profile <mux> = encapsulation: llc, vcmux <pvid> = default VLAN ID, 1~4094 <priority> = default priority, 0~7	M
		show	<slot>|<slot-port>|<slot-port-vpi/vci> [detail]	Displays runtime configured virtual channels.	L
		usratelimit	enable <pvc>	Activates upstream rate limiting on the PVC.	M
			disable <pvc>	Deactivates upstream rate limiting on the PVC.	M
			set <pvc> <rate>	Sets the maximum upstream rate (in Kbps) the PVC is allowed to use.	M
			show <pvc>	Displays upstream rate limiting settings.	L
		vlan	<slot-port-vpi/vci> <vid> <registration> <tag>	Adds a PVC channel to a VLAN. <registration> = join or leave <tag> = TX tagging, tag or untag	M
	shdsl			SHDSL specific commands.	
		alarmprof	<slot-port> span|stuc|stur|* <alarmprofile>	Sets SHDSL ports or end point(s) to use an alarm profile. span = set alarm profile for the whole span stuc = set alarm profile at stuc end point stur = set alarm profile at stur end point * = set alarm profile at both stuc and stur	M
		pbo	<slot-port> normal_epl|forced_epl|forced_no_epl <value>	Sets power backoff for SHDSL port(s). normal_epl = Power backoff with EPL (Estimated Power Loss). forced_epl = Forced power backoff with EPL. forced_no_epl = Forced power backoff without EPL. <value> = 0~31 in dB	M
		pmms	<slot-port> <mode>	Sets the negotiated noise margin mode of the SHDSL port(s). <mode> = negotiated noise margin mode, normal|forced	M
		set	<slot-port> <profile_name>	Sets SHDSL port(s) to use a profile created by the profile shdsl set command.	M
	show	<slot>|<slot-port>		Displays port settings.	L
	tel	<slot-port> <telephone-no>		Records a DSL port(s) subscriber's telephone number.	M
	tlspvc			Commands to configure Transparent LAN Service (TLS) or VLAN stacking on the PVCs.	

Table 152 port Commands (continued)

COMMAND				DESCRIPTION	P
		delete	<slot-port-vpi/vci>	Removes a TLS PVC.	M
		set	<slot-port-vpi/vci> <profile> llc|vcmux <vid> <priority>	Sets/changes TLS PVC settings.	M
		show	<slot>|<slot-port>|<slot-port-vpi/vci>	Displays the settings for a TLS PVC.	L
	vdsl	alarmprof	<slot-port> <profile>	Sets the VDSL port(s) to use the specified alarm profile.	M
		frametype	<slot-port> <all|tag>	Sets the acceptable frame type on the VDSL port(s).	M
		frequencyplan	<slot-port> <997|998>	Sets the band plan the VDSL port(s) uses.	M
		priority	<slot-port> <priority>	Sets the VDSL port(s) VLAN priority (0 - 7).	M
		pvid	<slot-port> <vid>	Sets the port VID on the VDSL port(s).	M
		rfiband	<slot-port> <disable|ansi|etsi|custom>	Selects an RFI band or disables this feature.	M
		rficustom		Uses these commands to set custom RFI settings. The settings are applied to all VDSL ports.	
			disable <index>	Displays the settings of a custom RFI entry.	M
			enable <index>	Activates the specified custom RFI entry.	M
			set <index> <start_freq> <stop_freq>	Sets a custom RFI entry. index = 1 - 8 start_freq = start of the frequency range in kHz. start_freq cannot be bigger than stop_freq. stop_freq= end of the frequency range in kHz.	M
			show	Displays custom RFI settings.	L
		set	<slot-port> <profile> <vdsl_profile>	Specifies the profiles on the VDSL port(s). profile = custom line profile. vdsl_profile = 8a|8b|8c|8d|12a|	M
		tls	disable <slot-port>	Disables Transparent LAN Service (TLS). The system does not insert additional VLAN tags to packets.	M
			enable <slot-port>	Disables Transparent LAN Service (TLS) to insert additional VLAN tags to packets.	M
			set <slot-port> <svid> <spriority>	Sets/changes TLS settings on the VDSL port(s).	M

Table 152 port Commands (continued)

COMMAND				DESCRIPTION	P
		upbo	<slot-port> <on|off>	Enables/disable Upstream Power Back Off (UPBO).	M
		vlan	<slot-port> <vid> <registration> <tag>	Sets the VLAN setting on the VDSL port(s).	M

17.7.11 profile Commands

Use the `profile` commands to configure DSL, alarm and traffic profiles.

Table 153 profile Commands

COMMAND				DESCRIPTION	P
profile					
	adsl			ADSL profiles allow efficient configuration of ADSL port settings.	M
		delete	<profile>	Removes an unreferenced ADSL port settings profile.	M
		map	<profile>	Displays which ADSL ports reference this profile.	L
		set	<profile> <us-max-rate> <ds-max-rate> [fast|delay <us-delay> <ds-delay>][minrate <us-min-rate> <ds-min-rate>] [usmgn <us-max-mgn> <us-min-mgn> <us-tgt-mgn>][dsmgn <ds-max-mgn> <ds-min-mgn> <ds-tgt-mgn>] [usra fixed|startup|runtime <us-us-mgn> <us-ds-mgn>][dsra fixed|startup|runtime <ds-us-mgn> <ds-ds-mgn>]	Creates a profile of ADSL port settings. “us” is UpStream, “ds” is DownStream us maximum rate = 64~4096 in Kbps ds maximum rate = 64~32000 in Kbps us/ds delay = 1~255 in ms us minimum rate = 32~4096 in Kbps ds minimum rat e= 32~32000 in Kbps max noise margin = 0~310 in 0.1 dB min. noise margin = 0~310 in 0.1 dB target noise margin = 0~310 in 0.1 dB `fixed` = no rate adaptation `startup` = rate adaptation at initialization `runtime` = rate adaptation any time up shift noise margin = 0~310 in 0.1 dB us/ds down shift noise margin = 0~310 in 0.1 dB	M
		show	[<profile>]	Lists the ADSL configuration profiles or a specific profile’s detailed settings.	L
	alarmadsl			ADSL alarm profiles allow efficient configuration of ADSL alarm settings.	
		delete	<profile>	Removes an unreferenced ADSL alarm profile.	M
		map	<profile>	Displays which ADSL ports reference this alarm profile.	L

Table 153 profile Commands (continued)

COMMAND				DESCRIPTION	P
		set	<profile> atuc [lofs <lofs>] [loss <loss>] [lols <lols>] [lprs <lprs>] [ess <ess>] [ffr <ffr>] [sesl <sesl>] [uasl <uasl>] [fru <fru>] [iru <iru>] [frd <frd>] [ird <ird>] [ift <ift>] or <profile> atur [lofs <lofs>] [loss <loss>] [lprs <lprs>] [ess <ess>] [sesl <sesl>] [uasl <uasl>] [fru <fru>][iru <iru>][frd <frd>] [ird <ird>]	Creates a profile of ADSL alarm settings. <profile> = profile name, up to 31 characters atuc = near end atur = far end <lofs> = number of loss of framing seconds, 0~900 <loss> = number of loss of signal seconds, 0~900 <lols> = number of loss of link seconds, 0~900 <lprs> = number of loss of power seconds, 0~900 <ess> = number of error seconds, 0~900 <ffr> = number of failed fast retrains seconds, 0~900 <sesl> = number of severely errored seconds-line, 0~900 <uasl> = number of unavailable seconds-line, 0~900 <fru> = fast rate up in Kbps, 0~2147483 <iru> = interleave rate up in Kbps, 0~2147483 <frd> = fast rate down in Kbps, 0~2147483 <ird> = interleave rate down in Kbps, 0~2147483 <ift> = init failure trap enable, 1-enable, 0-disable	M
		show	[<profile>]	Lists the ADSL alarm profiles or a specific profile's settings.	L
	alarmshdsl			SHDSL alarm profiles allow efficient configuration of SHDSL alarm settings.	
		delete	<profile>	Removes an unreferenced SHDSL alarm profile.	M
		map	<profile>	Displays which SHDSL ports reference this alarm profile.	L

Table 153 profile Commands (continued)

COMMAND				DESCRIPTION	P
		set	<profile> [atten <atten>] [snrmgn <snrmgn>] [es <es>] [ses <ses>][crc <crc>] [losws <losws>] [uas <uas>]	Creates a profile of SHDSL alarm settings. <profile> = profile name, up to 31 characters <atten> = loop attenuation threshold, 0~127 <snrmgn> = snr margin threshold, 0~15 <es> = number of errored seconds, 0~900 <ses> = severely errored seconds, 0~900 <crc> = the number of CRC anomalies, >=0 <losws> = number of loss of sync word seconds, 0~900 <uas> = number of unavailable seconds, 0~900	M
		show	[<profile>]	Lists the SHDSL alarm profiles or a specific profile's settings.	L
	alarmadsl			ADSL alarm profiles allow efficient configuration of ADSL alarm settings.	
		delete	<profile>	Removes an unreferenced ADSL alarm profile.	M
		map	<profile>	Displays which ADSL ports reference this alarm profile.	L

Table 153 profile Commands (continued)

COMMAND				DESCRIPTION	P
		set	<profile> atuc [lofs <lofs>] [loss <loss>] [lols <lols>] [lprs <lprs>] [ess <ess>] [ffr <ffr>] [sesl <sesl>] [uasl <uasl>] [fru <fru>] [iru <iru>] [frd <frd>] [ird <ird>] [ift <ift>] or <profile> atur [lofs <lofs>] [loss <loss>] [lprs <lprs>] [ess <ess>] [sesl <sesl>] [uasl <uasl>] [fru <fru>][iru <iru>][frd <frd>] [ird <ird>]	Creates a profile of ADSL alarm settings. <profile> = profile name, up to 31 characters atuc = near end atur = far end <lofs> = number of loss of framing seconds, 0~900 <loss> = number of loss of signal seconds, 0~900 <lols> = number of loss of link seconds, 0~900 <lprs> = number of loss of power seconds, 0~900 <ess> = number of error seconds, 0~900 <ffr> = number of failed fast retrains seconds, 0~900 <sesl> = number of severely errored seconds-line, 0~900 <uasl> = number of unavailable seconds-line, 0~900 <fru> = fast rate up in Kbps, 0~2147483 <iru> = interleave rate up in Kbps, 0~2147483 <frd> = fast rate down in Kbps, 0~2147483 <ird> = interleave rate down in Kbps, 0~2147483 <ift> = init failure trap enable, 1-enable, 0-disable	M
		show	[<profile>]	Lists the ADSL alarm profiles or a specific profile's settings.	L
	alarmvdsl			VDSL alarm profiles allow efficient configuration of VDSL alarm settings.	
		delete	<profile>	Removes an unreferenced VDSL alarm profile.	M
		map	<profile>	Displays which VDSL ports reference this alarm profile.	L

Table 153 profile Commands (continued)

COMMAND				DESCRIPTION	P
		set	<profile> [lofs <lofs>] [loss <loss>] [lols <lols>] [lprs <lprs>] [ess <ess>] [sesl <sesl>] [uasl <uasl>] [ift <ift>]	Creates a profile of VDSL alarm settings. <profile> = profile name, up to 31 characters <lofs> = number of loss of framing seconds, 0~900 <loss> = number of loss of signal seconds, 0~900 <lols> = number of loss of link seconds, 0~900 <lprs> = number of loss of power seconds, 0~900 <ess> = number of error seconds, 0~900 <sesl> = number of severely errored seconds-line, 0~900 <uasl> = number of unavailable seconds-line, 0~900 <ift> = init failure trap enable, 1-enable, 0-disable	M
		show	[<profile>]	Lists the VDSL alarm profiles or a specific profile's settings.	L
	atm			ATM traffic profiles allow efficient configuration of ATM traffic settings.	
		delete	<profile>	Removes an unreferenced ATM traffic profile.	M
		map	<profile>	Displays which ports reference this ATM profile.	L
		set	<atmprofile> cbr|ubr <pcr> <cdvt> or <atmprofile> rt-vbr|nrt-vbr <pcr> <cdvt> <scr> <bt>	Creates a profile of ATM traffic settings. cbr = constant cell rate ubr = unspecified cell rate rt-vbr = realtime variable bit rate nrt-vbr = non-realtime variable bit rate <pcr> = peak cell rate, 150~300000 <scr> = sustainable cell rate, 150~300000 <cdvt> = cell delay variation tolerance, 0~255 <bt> = burst tolerance, 0~255 Note: <pcr>, <cdvt>, <scr> and <bt> can be inputted '*' as default value Note: use "*" to set <pcr>, <cdvt>, <scr> or <bt> to the default value.	M
		show	[<profile>]	Lists the ATM traffic profiles or a specific profile's settings.	L
	igmpfilter			IGMP filter profiles allow you to control access to IGMP multicast groups.	
		delete	<igmpfilter>	Removes an unreferenced IGMP filter profile.	M

Table 153 profile Commands (continued)

COMMAND				DESCRIPTION	P
		map	<igmpfilter>	Displays which ports reference this IGMP filter profile.	L
		set	<igmpfilter> <index> <startip> <endip>	Creates an IGMP filter profile of ATM traffic settings. <igmpfilter> = profile name <index> = index of address, 1~16 <startip> = start of address range <endip> = end of address range	M
		show	[igmpprofile]	Lists the IGMP filter profiles or a specific profile's settings.	L
	profsvr	show		Displays the current profile server setting.	L
		mode	client|server	Sets the profile server operation mode.	M
		clientlist	set <ip> <type>	Adds an entry to the profile server client list.	M
			delete <ip>	Removes an entry from the profile server client list.	M
			show	Displays the profile server client list.	L
		serverset	<ip>	Sets the target profile server IP address for synchronization.	M
		sync		Synchronize with the profile server.	M
	shdsl			SHDSL profiles allow efficient configuration of SHDSL port settings.	
		delete	<profile>	Removes an unreferenced SHDSL port settings profile.	M
		map	<profile>	Displays which SHDSL ports reference this profile.	L
		set	<profile> <min-rate> <max-rate> [annexa|annexb 2wire|4wire|mpair4 [lp_off | lp_on_cur [curr_margin] | lp_on_wc [worst_margin]]]	Creates a profile of SHDSL port settings. <min-rate> = minimum rate, 192~4096 in Kbps <max-rate> = maximum rate, 192~4096 in Kbps annexa|annexb = regional setting, 'annexb' by default <wire-pair> = the number of wire pairs to be used, '2wire' by default lp_off = disable line probe, default line probe mode lp_on_cur = enable line probe with current target snr margin lp_on_wc = enable line probe with worst case target snr margin <curr-margin> = current condition target snr margin, -10~21 in dB <worst-margin> = worse case noise margin, -10~21 in dB	M
		show	[<profile>]	Lists the SHDSL port setting profiles or a specific profile's settings.	L

Table 153 profile Commands (continued)

COMMAND				DESCRIPTION	P
	vdsl			VDSL profiles allow efficient configuration of VDSL port settings.	
		delete	<profile>	Removes a VDSL port settings profile.	M
		map	<profile>	Displays which VDSL ports reference this profile.	L
		set	<profile> <us-max-rate> <ds-max-rate> [fast|delay <us-delay> <ds-delay>] [minrate <us-min-rate> <ds-min-rate>] [usmgn <us-max-mgn> <us-min-mgn> <us-tgt-mgn>] [dsmgn <ds-max-mgn> <ds-min-mgn> <ds-tgt-mgn>]	Creates a VDSL line profile. “us” is UpStream, “ds” is DownStream us maximum rate = 64~45440 in Kbps ds maximum rate = 64~100032 in Kbps us/ds delay = 1~255 in ms us minimum rate = 64~4096 in Kbps ds minimum rat e= 64~32000 in Kbps max noise margin = 0~310 in 0.1 dB min. noise margin = 0~310 in 0.1 dB target noise margin = 0~310 in 0.1 dB	M
		show	[<profile>]	Lists the VDSL port setting profiles or a specific profile’s settings.	L

17.7.12 show Commands

The `show` commands display runtime status information.

Table 154 show Commands

COMMAND				DESCRIPTION	P
show					
	adsl	linedata	<slot-port>	Displays an ADSL port’s line bit allocation.	L
		linegain	<slot-port>		L
		linehlog		Displays ADSL line channel characteristics. The format provides magnitude values in a logarithmic scale.	L
		lineqln		Displays the Quiet Line Noise for a DMT tone is the rms (root mean square) level of the noise present on the line, when no ADSL signals are present. It is measured in dBm/Hz. The QLN can be used in analyzing crosstalk.	L
		linetssi			L
	arp			Displays the ARP table.	L

Table 154 show Commands (continued)

COMMAND				DESCRIPTION	P
	atm	<slot-port>|<slot-port-vpi/vci> [reset]		Displays ATM traffic counters.	L
	dhcp	counter	<slot>|<slot-port>	Displays port DHCP statistics.	L
		snoop	<slot-port>	Displays port DHCP snooping information.	L
	dot3ad			Displays the (IEEE 802.3ad) link aggregation settings.	L
	enet	<giga-port>|<slot>		Displays Ethernet packet counters.	L
	igmp	info		Displays IGMP related statistics.	L
		group	[<vid> <group_ip>]	Displays the learned IGMP group settings and status.	L
		port	info <slot-port>	Displays IGMP related information on the port.	L
			group <slot-port>	Displays joint IGMP group information on the port.	L
	ip			Displays management IP settings.	L
	ipbpvc	arpproxy	all|domain [<domain>]|edgerouter [<ip> <vid>]|interface [<ip/mask> <vid>]	Display whole ARP table. Display learnt ARP table for a domain. Display learnt ARP table for all/an edge router. Display learnt ARP table for all/an interface. Age time information is included.	L
		interface	[<ip/mask>|<vid|<ip/mask> <vid>]	Display runtime interfaces.	L
		route	[<domain>]|[<ip/mask>]|[<domain> <ip/mask>]]	Display runtime routing table.	L
	lineinfo	<slot-port>		Displays DSL line information.	L
	lineperf	<slot-port>		Displays DSL line performance statistics.	L
	linerate	<slot-port>		Displays DSL line rate values.	L
	linestat	<slot-port>		Displays DSL link status.	L
	mac	[<giga-port>|<mac>|<slot>|<slot-port>|vid <vid1>[-<vid2>]]		Displays a port's IEEE 802.1d MAC address forwarding table.	L

Table 154 show Commands (continued)

COMMAND				DESCRIPTION	P
	monitor	<slot>		Displays a card's hardware monitor statistics.	L
	mstp	<mstid> [<end_mstid>]		Displays MSTP information for the Ethernet ports.	L
	packet	<slot-port>		Displays a port's packet counter.	L
	paepvc	counter	<slot-port>|<slot-port-vpi/vci>	Displays PAE PVC counter statistics.	L
		session	<slot-port>|<slot-port-vpi/vci>	Displays PAE PVC session information.	L
	performance	<slot-port> curr|15min|1day		Displays a DSL port's performance counters.	L
	sys			Displays the CPU utilization and memory usage status.	L
	rmon	stats|history <giga-port>		Displays Gigabit Ethernet interface link RMON information.	L
	user			Displays information on logged in users. * denotes your session.	L
	vlan	[<vid>]|[<start-vid> <end-vid>]		Displays current VLANs.	L

17.7.13 switch Commands

The `switch` commands configure switching functions and manage the Ethernet interfaces.

Table 155 switch Commands

COMMAND				DESCRIPTION	P
switch					
	bandwidth	disable	<giga-port>	Turns off bandwidth control on the specified port(s).	M
		enable	<giga-port>	Turns on bandwidth control on the specified port(s).	M
		set	<giga-port> <ingress-rate> <egress-rate>	Sets the incoming or outgoing bandwidth control for the specified port(s). 0~1000 (Mbps).	M
		show		Displays the bandwidth control settings.	L
	bcastctrl	show		Displays broadcast and multicast storm control settings.	L

Table 155 switch Commands (continued)

COMMAND				DESCRIPTION	P
		threshold	<giga-port> <bc-limit> <mc-limit> <uu-limit>	Sets the limitations of broadcast, multicast and unknown unicast packets, in packets per second for each trunk port (0~262143, -1 means no limit). <bc-limit> = broadcast packet limit <mc-limit> = multicast packet limit <uu-limit> = unknown unicast packet limit	M
	dot3ad	aggport	<portlist> t1|t2|t3|t4|none	Creates a link aggregation trunk groups.	M
		disable	[t1|t2|t3|t4]	Turns off link aggregation on the specified trunk group.	M
		enable	[t1|t2|t3|t4] [lacp]	Turns on link aggregation on the specified trunk group. lacp turns on LACP protocol.	M
		lacp	priority <priority>	Sets the LACP system priority (0~65535).	M
			show	Displays LACP settings.	L
			timeout short|long	Sets the time interval between exchanging LACP packets.	M
		show		Displays the link aggregation state.	L
	garptimer	join	<join-msec>	Sets the GARP timer's Join Timer in milliseconds, 100~32766.	M
		leave	<leave-msec>	Sets the GARP timer's Leave Timer in milliseconds, 201~65534.	M
		leaveall	<leaveall-msec>	Sets the GARP timer's Leave All Timer in milliseconds, 202~65535.	M
		set	<join-msec> <leave-msec> <leaveall-msec>	Sets GARP timers.	M
		show		Displays the GARP timer settings.	L
	isolation	disable		Turns off the subscriber isolation feature.	M
		enable		Turns on the subscriber isolation feature.	M
		vlan	delete <vid>	Deletes the specified isolation VLAN.	M
			set <vid>	Creates the specified isolation VLAN.	M
		show		Displays the subscriber isolation feature's current setting.	L
	mac	flush	enet|all	Clears the MAC table on the Ethernet ports or all ports (Ethernet and subscriber ports).	M
	mstp	cfgname	<config name>	Sets a descriptive name for the MSTP configuration.	M
		disable		Deactivates MSTP on the system.	M
		enable		Activates MSTP on the system.	M
		fwdelay	<fwdelay-sec>	Sets the maximum time (between 4 and 30 seconds) a switch will wait before changing states	M

Table 155 switch Commands (continued)

COMMAND				DESCRIPTION	P
		hellotime	<hellotime-sec>	Sets the time interval (between 1 and 10 seconds) between BPDU (Bridge Protocol Data Units) configuration message generations by the root switch.	M
		maxage	<maxage-sec>	Sets the maximum time (between 6 and 40 seconds) a switch can wait without receiving a BPDU before attempting to reconfigure.	M
		maxhops	<max-hops>	Sets the number of hops (between 1 and 255) in an MSTP region before the BPDU is discarded and the port information is aged.	M
		priority	<mstid> <priority>	Sets the priority of the switch for the instance ranges. The lower the number, the more likely the switch will be chosen as the root bridge. Enter 0, 4096, 8192, 12288, 16384, 20480, 24576, 28672, 32768, 36864, 40960, 45056, 49152, 53248, 57344 or 61440 in this field.	M
		revision	<revision level>	Sets the configuration version number (0 - 65535).	M
		show		Displays MSTP settings.	L
		version	rstp|mstp	Sets the spanning tree protocol version the switch uses.	M
		vlanmap	<mstid> <vid> [<end_vid>]	Sets the VLAN-MSTID mapping.	M
	port	disable	<giga-port>	Turns off data transmission on a port.	M
		dscp	disable <giga-port>	Deactivates DSCP-IEEE 802.1p mappings on this port.	M
			enable <giga-port>	Activates DSCP-IEEE 802.1p mappings on this port.	M
			set <giga-port> <srccp> <mapcp> <mappri>	Sets DSCP-IEEE 802.1p mappings on this port. <srccp>: source code point, 0~63, example: 1,3~5,10~15 <mapcp>: code point, 0~63 <mappri>: priority, 0~7	M
			show [<giga-port>]	Displays DSCP-IEEE 802.1p mappings on this port.	L
		enable	<giga-port>	Turns on data transmission on a port.	M
		flowctrl	disable <giga-port>	Turns off flow control on a port.	M
			enable <giga-port>	Turns on flow control on a port.	M
		frametype	<giga-port> all|tag	Sets the port(s) to accept VLAN tagged and untagged Ethernet frames or only tagged.	M
		gvrp	disable <giga-port>	Turns on GVRP for a port(s).	M

Table 155 switch Commands (continued)

COMMAND				DESCRIPTION	P
			enable <giga-port>	Turns off GVRP for a port(s).	M
		mode	<giga-port> uplink|subtend	Sets a port to operate as uplink or subtending.	M
		mstp	disable <giga-port> <mstid>	Deactivates MSTP on the port in the spanning tree instance.	M
			enable <giga-port> <mstid>	Activates MSTP on the port in the spanning tree instance.	M
			pathcost <giga-port> <mstid> <pathcost>	Sets the path cost (between 0 and 200000000). Enter 0 to have the system automatically set the path cost based on the link speed.	M
			p2plink <giga-port> auto|enable|disable	Enables point-to-point connection.	M
			priority <giga-port> <mstid> <priority>	Specify the priority (0 - 255) of the Ethernet port in the MST region. The system automatically rounds the number to the nearest multiple of 16.	M
			show <mstid> [<end_mstid>]	Displays MSTP settings.	L
		name	<giga-port> <name>	Sets the name of a port.	M
		priority	<giga-port> <priority>	Sets a port's default ingress user priority (0~7).	M
		pvid	<giga-port> <vid>	Sets the PVID (Port VLAN ID) (1~4094) assigned to untagged frames or priority frames (0 VID) received on this port(s).	M
		show		Displays port settings.	L
		speed	<giga-port> <speed>	Sets a port's speed and duplex mode.	M
		vlantrunk	disable <giga-port>	Turns off VLAN trunking on a port to have it only accept frames with registered VIDs.	M
			enable <giga-port>	Turns on VLAN trunking on a port to have it accept frames with any VID.	M
	qschedule	set	<giga-port> spq or <giga-port> wrr <wt0> <wt1> <wt2> <wt3> <wt4> <wt5> <wt6> <wt7>	Sets a port's queuing method and/or priority weight. spq = strict priority queuing algorithm wrr = weighted round robin queue algorithm <wt0>~<wt7> = priority weight, 0~15	M
		show		Displays the queuing settings.	L
	queuemap	set	<priority> <queue>	Sets a queue's priority.	M
		show		Displays the queues' priorities.	L

17.7.14 sys Commands

The `sys` commands are for system management and maintenance.

Table 156 sys Commands

COMMAND				DESCRIPTION	P
sys					
	baud	set 9600|19200|38400|57600|115200		Sets the console port speed.	M
		show		Displays the console port speed.	L
	chsh	[engsh|stdsh]		Changes to normal or privileged command shell.	H
	client	disable	<index>	Turns off a secured client set.	M
		enable	<index>	Turns on a secured client set.	M
		set	<index> <start-ip> <end-ip> [telnet] [ftp] [web] [icmp] [ssh] [snmp]	Sets a group of trusted computers from which you can manage the switch.	M
		show		Displays the secured client sets.	L
	date	set	<yyyy> <mm> <dd>	Sets the system date.	M
		show		Displays the current system date.	L
	info	chassis	<chassis>	Sets the system chassis number (1~64).	M
		contact	<contact>	Sets contact person information.	M
		frame	<frame>	Sets the system frame number.	M
		hostname	<hostname>	Sets the system name.	M
		location	<location>	Sets the geographic location of the system.	M
		show		Displays general system and MSC1000G information.	L
	monitor	set	<slot> <volt|temp|fan|cup> <index> <high-limit> <low-limit>	Sets the hardware monitor threshold settings.	M
		show	<slot>	Displays the hardware monitor threshold settings of a slot.	L
	multilogin	disable		Turns off multiple concurrent logins.	M
		enable		Turns on multiple concurrent logins.	M
		show		Displays the multiple login setting.	L
	reboot			Restarts the system.	H
		[show]		Displays the reboot schedule.	H
		<sec>		Sets the number of seconds (1~2147483647) before the system reboots. If there is no time specified, the system reboots immediately.	H
		[cancel]		Aborts the scheduled system rebooting.	H

Table 156 sys Commands (continued)

COMMAND				DESCRIPTION	P
	server	enable	telnet|ssh|ftp|web|icmp|snmp	Turns on service access to the switch.	M
		disable	telnet|ssh|ftp|web|icmp|snmp	Turns off service access to the switch.	M
		port	telnet|ftp|web|snmp|ssh <port>	Sets a port for a service.	M
		show		Displays service access control settings.	L
	snmp	getcommunity	<community>	Sets the SNMP GetRequest community.	M
		setcommunity	<community>	Sets the SNMP SetRequest community.	M
		show		Displays SNMP settings.	L
		trapcommunity	<community>	Sets the SNMP Trap community.	M
		trapdst	<index> <destination> [<port>] [v1|v2c|v3] [<name>]	Sets the IP addresses and listening ports for up to four SNMP trap server IP addresses and listening ports. Set 0.0.0.0 to not send any SNMP traps. <name> = username to be included in trap packets. Only applicable for V3.	M
		user	<name> noauth|auth|priv md5|sha des|aes	Sets SNMPv3 user name and security settings. noauth = disables user authentication and data encryption. auth = enables user authentication. pri = enables user authentication and data encryption. md5|sha = authentication method. des|aes = encryption method.	M
		version	v2c|v3|v3v2c	Sets the system to use the specified SNMP version and access. v2c = SNMPv2 read/write v3 = SNMPv3 read/write v3v2c = SNMPv3 read/write and SNMPv2 read-only.	M
	syslog	disable		Turns off syslog logging.	M
		enable		Turns on syslog logging.	M
		server	<fac> <ip>	Sets the log facility (local1~local7) to log the syslog messages to a specific file in the syslog server. See your syslog program's documentation for details. Sets the syslog server IP address.	M
		show		Displays the syslog settings.	L
	time	set	<hh> [<mm> [<ss>]]	Sets the system time.	M
		show		Displays the current system time.	L
	timeserver	set	none	Clears the time server settings.	M

Table 156 sys Commands (continued)

COMMAND				DESCRIPTION	P
			daytime <ip> [sync] or time|ntp <ip> <utc[<+|-> 0100~1200]> [sync]	Sets the time service protocol and IP address of a time server. [sync] = Gets the time and date.	M
		show		Displays the time server settings.	L
		sync		Gets the time and date from a predefined time server.	M
	user	auth	<mode>	Select which database the switch uses to authenticate a user. 1 = local, 2 = radius, 3 = local then radius 4 = TACACS+, 5 = local then TACACS+.	H
		delete	<name>	Removes a user account.	H
		disable	<name>	Stops a user from logging in.	H
		enable	<name>	Allows a user to log in.	H
		online		Displays information about online users that are logged into the switch. * denotes your session.	L
		server	<ip> <port> <secret> [high|middle|low|deny]	Sets a RADIUS server's IP address and port number and the password to access the server. low = assigns the login accounts a low privilege level if the received service type is "login". medium = assigns the login accounts a medium privilege level if the received service type is "nas-prompt". high = assign the login accounts a high privilege level if the received service type is "admin". deny = block access from this login account if no service type is received.	H
		set	<username> <password> high|middle|low	Sets a user account and its level of access privileges.	H
		show		Displays authentication settings and user accounts.	L
	version			Displays the MSC1000G's general information such as the model name and firmware version.	L

17.7.15 vlan Commands

Use the VLAN commands for static VLAN management.

Table 157 vlan Commands

COMMAND				DESCRIPTION	P
vlan					
	delete	<vid>		Removes a static VLAN.	M
	disable	<vid>		Turns off a VLAN.	M
	enable	<vid>		Turns on a VLAN.	M
	name	<vid> <name>		Sets the name of a VLAN.	M
	set	<vid> <giga-port> fix|forbid|normal tag|untag		Adds a static VLAN. <giga-port> = sub1|sub2 |up1|up2|all if trunking is not enabled; sub|up|all if trunking is enabled.	M
	show	[<vid>]|[<start-vid> <end-vid>]		Displays all VLANs' settings, a specified VLAN's settings or a range of static VLANs' settings.	L

18

acl Commands

This chapter describes the Access Control List management commands.

18.1 acl Commands Summary

The following table lists the `acl` commands. The **P** column on the right indicates the administrator privilege level needed to use the command (**H** for high, **M** for middle or **L** for low).

Table 158 acl Commands

COMMAND				DESCRIPTION	P
`acl`					
	`dhcprelay82`	`clearinfo`	`<vid>`	Removes option 82 information for the specified VLAN.	M
		`delete`	`<vid>`	Deletes the option 82 information entry for the specified VLAN.	M
		`disable`	`<vid>`	Deactivates option 82 for the specified VLAN.	M
		`enable`	`<vid> <mode>`	Enables option 82 information for the specified VLAN. `<mode>` = `1` or `2` `1`: Enable DHCP relay and option82. `2`: Disable DHCP relay but enable option82.	M
		`info`	`<vid> <string>`	Sets information for the option 82 Circuit ID field.	M
		`relaymode`	`<vid> [auto|both]`	Sets which DHCP relay mode the system uses for the specified VLAN. `auto` = send the requests to the active DHCP server first. If the active DHCP server does not respond, the switch sends the DHCP request to the backup DHCP server. `both` = send the requests to both the active and backup DHCP servers.	M

Table 158 acl Commands (continued)

COMMAND				DESCRIPTION	P
		server	active <vid> <1|2>	Sets the active DHCP server to which the DHCP requests are sent first. <vid> = a VLAN ID to be served with DHCP relay. 1 = Sets the first DHCP server as the active server. 2 = Sets the second DHCP server as the active server. The default is 1.	M
			set <vid> <serverip1> [serverip2]	Sets an entry for forwarding DHCP requests to the DHCP servers at the specified IP addresses. <vid> = a VLAN ID to be served with DHCP relay.	M
			delete <vid> [serverip]	Removes an entry for forwarding DHCP requests to the DHCP server at the specified IP address.	M
		set	<vid>	Creates an option 82 entry for the VLAN.	M
		show		Displays DHCP relay and option 82 settings.	L
		suboption2	enable <vid>	Turns on option 82 sub-option 2.	M
			disable <vid>	Turns off option 82 sub-option 2.	M
			set <vid> <info>	Adds the specified information for sub-option 2.	M
	dhcpsnoop			DHCP snooping allows the system to identify and block packets from devices using unknown/static IP addresses.	
		disable	<slot-port>	Deactivates DHCP snooping on the specified subscriber port(s).	M
		enable	<slot-port>	Activates DHCP snooping on the specified subscriber port(s).	M
		flush	<slot-port>	Clears the DHCP snooping table on the specified port(s).	M
		pool	delete <slot-port> <ip>	Removes the static IP address from the DHCP snooping table.	M
			set <slot-port> <ip>	Adds a static IP address to the DHCP snooping table. You can add up to 3 static IP addresses per port.	M
		show	<slot>|<slot-port>	Displays the DHCP snooping table on the specified port.	L
	dot1x			IEEE 802.1x authentication.	
		disable		Turns off IEEE 802.1x.	M
		enable		Turns on IEEE 802.1x.	M

Table 158 acl Commands (continued)

COMMAND				DESCRIPTION	P
		port	control <slot-port> auto|auth|unauth	Sets the IEEE 802.1x port authentication option for specific subscriber ports. auto = authentication required auth = forced authentication unauth = forced no authentication	M
			disable <slot-port>	Turns off IEEE 802.1x for specific subscriber ports.	M
			enable <slot-port>	Turns on IEEE 802.1x for specific subscriber ports.	M
			period <slot-port> <secs>	Sets the IEEE 802.1x re-authentication period (60~65535) for specific subscriber ports.	M
			reauth <slot-port> on|off	Sets the IEEE 802.1x re-authentication option for specific subscriber ports.	M
			show <slot>	Displays IEEE 802.1x settings.	L
		radius	ip <index> <ip>	Sets the IP address of the specified external RADIUS server (1 or 2).	M
			port <index> <port>	Sets the external RADIUS server port number of the specified RADIUS server.	M
			secret <index> <secret_key>	Sets the authentication and encryption key of the specified RADIUS server.	M
		show		Displays the external RADIUS server settings.	L
	dsbcast	enable	<slot-port> <vid>	Turns on the blocking of downstream broadcast packets from going to the specified VLAN on the specified port.	M
		disable	<slot-port> <vid>	Turns off the blocking of downstream broadcast packets to go to the specified VLAN on the specified port.	M
		show	<slot>|<slot-port>	Displays the settings for blocking downstream broadcast packets for the specified slot or port.	M
	maccount			MAC count limits the number of MAC addresses that can connect to a subscriber port.	
		disable	<slot-port>	Turns off MAC count limiting on the specified subscriber ports.	M
		enable	<slot-port>	Turns on MAC count limiting on the specified subscriber ports.	M
		set	<slot-port> <count>	Sets the MAC count limit number (1-128) on the specified subscriber ports.	M

Table 158 acl Commands (continued)

COMMAND				DESCRIPTION	P
		show	<slot>	Displays MAC count limiting settings.	L
	macfilter			MAC filter allows only traffic from specified source MAC addresses on the specified subscriber ports.	M
		delete	<slot-port> <mac>	Removes a MAC filter MAC address entry.	M
		disable	<slot-port>	Turns off the MAC filter on the specified subscriber ports.	M
		enable	<slot-port>	Turns on the MAC filter on the specified subscriber ports.	M
		mode	<slot-port> <accept|deny>	Sets the MAC filter actions.	M
		set	<slot-port> <mac>	Adds a MAC filter MAC address entry.	M
		show	<slot>|<slot-port>	Displays MAC filter settings.	L
	ouifilter			MAC OUI (Organization Unit Identifier) filter allows or drops packets with MAC addresses from specific vendors.	
		delete	<slot-port> <mac>	Removes the static MAC OUI filter. <mac> = first three octets of the MAC address.	M
		disable	<slot-port>	Deactivates MAC OUI filtering on this port.	M
		enable	<slot-port>	Activates MAC OUI filtering on this port.	M
		mode	<slot-port> <accept|deny>	Sets the filter action.	M
		set	<slot-port> <mac>	Creates a MAC OUI filter. <mac> = first three octets of the MAC address.	M
		show	<slot>|<slot-port>	Displays MAC OUI filter settings for the specified port or slot.	L
	pktfilter			Packet type filter allows or drops specified packet types on the specified subscriber ports.	
		set	<slot-port> <type>	Sets the packet type filter for the specified subscriber ports. <type> = accept-all, pppoe-only, or any combination of ip, arp, dhcp, eapol, pppoe, netbios, igmp separated by a space.	M
		show	<slot>	Displays packet type filter settings.	L
	pppoeagent	clearinfo	<vid>	Resets PPPoE line description for the VLAN.	M

Table 158 acl Commands (continued)

COMMAND				DESCRIPTION	P
		enable	<vid>	Enables PPPoE line information for the VLAN. The switch adds the line information to PPPoE packets for identification and security.	M
		delete	<vid>	Deletes PPPoE line information settings.	M
		disable	<vid>	Deactivate PPPoE line information insertion.	M
		info	<vid> <description>	Sets PPPoE line information. Enter a description (up to 24 characters).	M
		set	<vid>	Creates a PPPoE agent entry for the VLAN.	M
		show		Displays PPPoE line information settings.	L
	rule			Upstream access control rules allows you to apply profiles on the subscriber line PVC.	
		delete	<slot-port-vpi/vci> <profile>	Removes the ACL profile.	M
		set	<slot-port-vpi/vci> <profile>	Applies the ACL profile. You can apply up to 8 profiles to a PVC.	M
		show	<slot-port-vpi/vci>	Displays ACL profile settings for a PVC.	L

18.2 acl dhcp relay82 Commands

Use these commands to configure the DHCP relay feature.

18.2.1 acl dhcprelay82 clearinfo Command

Syntax:

```
acl dhcprelay82 clearinfo <vid>
```

This command deletes the relay agent information settings.

18.2.2 acl dhcprelay82 enable Command

Syntax:

```
acl  dhcprelay82 enable <vid> <mode>
```

where

<vid>	=	ID of the VLAN to which this setting applies.
<mode>	=	Sets the relay mode. 1 activates DHCP relay service and include option 82 information in the client DHCP requests for this VLAN. 2 disables DHCP relay service but include option 82 information in the client DHCP requests. Before broadcasting, the switch adds option82 information to DHCP requests.

This command enables DHCP relay on a VLAN and sets the relay mode.

The following example creates a configuration entry and enables DHCP relay mode 1 on VLAN 10.

```
ras> acl dhcprelay82 set 10
ras> acl dhcprelay82 enable 10 2
```

18.2.3 acl dhcprelay82 info Command

Syntax:

```
acl dhcprelay82 info <vid> <string>
```

where

<vid>	=	ID of the VLAN to which this setting applies.
<string>	=	Up to 23 English keyboard characters of additional information to add to the DHCP client TCP/IP configuration requests that are relayed to a DHCP server. Examples of information you could add would be the name of the system or the ISP.

This command sets the relay agent information to be included in client DHCP requests before forwarding. A DHCP server implements network information (such as IP address) policies based on the relay agent information.

The following example sets the system to add a string (test) to client DHCP request packets before forwarding them to the DHCP server.

```
ras> acl dhcprelay82 info test
```

18.2.4 acl dhcprelay82 relaymode Command

Syntax:

```
acl dhcprelay82 relaymode <mode>
```

where

<mode>	=	auto The system sends the requests to the active DHCP server first. If the active DHCP server does not respond, the switch sends the DHCP request to the backup DHCP server. both The system sends the requests to both the active and backup DHCP servers.

This command sets the DHCP relay mode on the system.

18.2.5 acl dhcprelay82 server active Command

Syntax:

```
acl dhcprelay82 server active <vid> <active-server>
```

where

<active-server>	=	1 Sets the first DHCP server as the active DHCP server. The system sends DHCP requests in the specified VLAN to the first DHCP server first. 2 Sets the second DHCP server as the active DHCP server. The system sends DHCP requests in the specified VLAN to the second DHCP server first.

This command specifies the DHCP server to which client DHCP requests are sent first. If you have also configured a second DHCP server, the non-active DHCP server will be the backup DHCP server. This function is applicable when you have configured two DHCP server settings for the VLAN.

The following example sets the system to forward client DHCP requests in VLAN 3 to the second DHCP server first.

```
ras> acl dhcprelay82 server active 3 2
```

18.2.6 acl dhcprelay82 server delete Command

Syntax:

```
acl dhcprelay82 server delete <vid> [serverip]
```

where

<vid>	=	A VLAN ID to be served with DHCP relay.
<serverip>	=	The IP address of a DHCP server.

This command removes a DHCP server setting to which DHCP client requests are forwarded in the specific VLAN.

18.2.7 acl dhcprelay82 server set Command

Syntax:

```
acl dhcprelay82 server set <vid> <primary-server> [secondary-server]
```

where

`<vid>`	=	A VLAN ID to be served with DHCP relay. Note: The DHCP server(s) must be in the same VLAN.
`<primary-server>`	=	The IP address of the primary DHCP server.
`<secondary-server>`	=	The IP address of the secondary DHCP server.

This command sets an entry for forwarding client DHCP requests received on a specific VLAN to the DHCP server(s) at the specified IP address(es).

The following example sets 192.168.1.10 and 192.168.1.11 as the primary and secondary DHCP servers respectively in VLAN 3.

```
ras> acl dhcprelay82 server set 3 192.168.1.10 192.168.1.11
```

18.2.8 acl dhcprelay82 set Command

Syntax:

```
acl dhcprelay82 set <vid>
```

This command creates a DHCP relay entry for the specified VLAN. After you have created an entry, you can configure DHCP relay and relay option82 settings.

The following figure creates an entry for VLAN 10.

```
ras> acl dhcprelay82 set 10
```

18.2.9 acl dhcprelay82 show Command

Syntax:

```
acl dhcprelay82 show
```

This command displays whether or not the DHCP relay feature is activated, the DHCP server's IP address, the status of the DHCP relay agent info option 82 feature and the information configured for it. It also lists the DHCP relay server entries.

The following figure shows an example. The asterisk (*) in front of a DHCP server address indicates that it is the active DHCP server in the VLAN.

```
ras> acl dhcprelay82 show
dhcp relay status:          disable
dhcp relay mode:            both
dhcp relay option82 info:   [NULL]
server list:
server set: 1
index  vid  primary-server     secondary-server
-----  -----  ------------------  ------------------
    1      3 192.168.1.10       (*)192.168.1.11
ras>
```

18.3 DHCP Relay Option 82 (Agent Information) Sub-option 2 (Remote ID)

Use the following commands to configure the DHCP relay Option 82 (agent information) feature, sub-option 2. This feature applies regardless of whether or not the DHCP relay is on.

18.3.1 Option 82 Sub-option 2 Enable Command

Syntax:

```
ras> acl dhcprelay82 suboption2 enable <vid>
```

where

`<vid>` = The ID of the VLAN to which to apply the setting.

This command turns on the DHCP relay agent information (Option 82, Sub-option 2) for the specified VLAN.

18.3.2 Option 82 Sub-option 2 Disable Command

Syntax:

```
ras> acl dhcprelay82 suboption2 disable <vid>
```

where

`<vid>` = The ID of the VLAN to which to apply the setting.

This command turns off the DHCP relay agent information (Option 82, Sub-option 2) for the specified VLAN.

18.3.3 Option 82 Sub-option 2 Set Command

Syntax:

```
ras> acl dhcprelay82 suboption2 set <vid> <info>
```

where

<vid>	=	The ID of the VLAN to which to apply the setting.
<info>	=	Up to 23 English keyboard characters of additional information for the MSC1000G to add to the DHCP requests that it relays to a DHCP server. Examples of information you could add would be the name of the MSC1000G or the ISP. To clear this field, type a pair of double quotation marks with no space between them ("").

This command adds the specified information for the relay agent (Option 82, Sub-option 2) for the specified VLAN.

18.4 acl dhcpsnoop Commands

Use these commands to configure or show DHCP snooping settings on the subscriber ports. The switch gets the client MAC-IP address information (in the reply from a DHCP server) and stores it in the DHCP snooping table. The system only forwards packets from the clients whose MAC-IP address is in the DHCP snooping table. Packets from unknown IP address(es) are not forwarded (dropped). This feature prevents subscribers from assigning their own static IP addresses.

18.4.1 acl dhcpsnoop disable Command

Syntax:

```
acl dhcpsnoop disable <slot-port>
```

This command disables the DHCP snooping feature on the specified port(s) on the line card.

18.4.2 acl dhcpsnoop enable Command

Syntax:

```
acl dhcpsnoop disable <slot-port>
```

This command activates the DHCP snooping feature on the specified port(s) on the line card. The following example enables DHCP snooping on port 1 of the line card in slot 3.

```
ras> acl dhcpsnoop enable 3-1
```

18.4.3 acl dhcpsnoop flush Command

Syntax:

```
acl dhcpsnoop flush <slot-port>
```

This command clears the DHCP snooping binding table. The system automatically clears the binding table when you disable DHCP snooping on a port.

18.4.4 acl dhcpsnoop pool set Command

Syntax:

```
acl dhcpsnoop pool set <slot-port> <ip>
```

This command adds a static IP address to the DHCP snooping table on a port.

The following example adds two static IP addresses (`192.168.1.10` and `192.168.1.11`) to the DHCP snooping table on port 10 of the line card in slot 2.

```
ras> acl dhcpsnoop pool set 2-10 192.168.1.10
ras> acl dhcpsnoop pool set 2-10 192.168.1.11
ras> acl dhcpsnoop show 2-10
 port enable static ip pool
----- ------ ------------------------------------------------
 2-10   -    192.168.1.10    192.168.1.11
ras>
```

18.4.5 acl dhcpsnoop pool delete Command

Syntax:

```
acl dhcpsnoop pool delete <slot-port> <ip>
```

This command removes a static IP address from the DHCP snooping table of a port on the specified line card. The following example removes the static IP address of 192.168.1.11 from the port 10 on the line card in slot 2.

```
ras> acl dhcpsnoop pool delete 2-10 192.168.1.11
ras> acl dhcpsnoop show 2-10
 port enable static ip pool
----- ------ ------------------------------------------------
 2-10   -    192.168.1.10
ras>
```

18.4.6 acl dhcpsnoop show Command

Syntax:

```
acl dhcpsnoop show <slot>|<slot-port>
```

Use this command to display the current static DHCP snooping settings of the port(s) on the line card. The following example displays the settings of port 10 on the line card in slot 2.

```
ras> acl dhcpsnoop show 2-10
 port enable static ip pool
----- ------ ------------------------------------------------
 2-10   -    192.168.1.10    192.168.1.11
ras>
```

18.5 acl dot1x Commands

Use these commands to configure the IEEE 802.1x authentication feature.

18.5.1 acl dot1x disable Command

Syntax:

```
acl dot1x disable
```

This command turns off the IEEE 802.1x authentication feature.

18.5.2 acl dot1x enable Command

Syntax:

```
acl dot1x enable
```

This command turns on the IEEE 802.1x authentication feature.

18.5.3 acl dot1x port control Command

Syntax:

```
acl dot1x port control <slot-port> auto|auth|unauth
```

where

`auto`	=	Authenticate all subscribers before they can access the network through this port.
`auth`	=	Allow all connected users to access the network through this port without authentication.
`unauth`	=	Deny all subscribers access to the network through this port.

This command sets the IEEE 802.1x port authentication option for specific subscriber ports.

18.5.4 acl dot1x port disable Command

Syntax:

```
acl dot1x port disable <slot-port>
```

This command turns off IEEE 802.1x for the specified subscriber ports.

18.5.5 acl dot1x port enable Command

Syntax:

```
acl dot1x port enable <slot-port>
```

This command turns on IEEE 802.1x for the specified subscriber ports.

18.5.6 acl dot1x port period Command

Syntax:

```
acl dot1x port period <slot-port> <secs>
```

where

<secs>	=	Sets the IEEE 802.1x re-authentication period in seconds (60~65535).

This command sets the IEEE 802.1x re-authentication period for the specified subscriber ports.

18.5.7 acl dot1x port reauth Command

Syntax:

```
acl dot1x port reauth <slot-port> on|off
```

This command enables or disables the IEEE 802.1x re-authentication option for the specified subscriber ports.

18.5.8 acl dot1x port show Command

Syntax:

```
acl dot1x port show <slot>
```

This command displays the IEEE 802.1x settings of the subscriber ports on the line card in the specified slot.

```
ras> acl dot1x port show 5
port enable control reauth period
---- ------ ------- ------ ------
5- 1   -    auto      V     3600
5- 2   -    auto      V     3600
5- 3   -    auto      V     3600
5- 4   -    auto      V     3600
5- 5   -    auto      V     3600
-------------------------- [ snip ] --------------------------
5-45   -    auto      V     3600
5-46   -    auto      V     3600
5-47   -    auto      V     3600
5-48   -    auto      V     3600
```

18.5.9 acl dot1x radius ip Command

Syntax:

```
acl dot1x radius ip <index> <ip>
```

where

<index>	=	The index number of an external RADIUS server entry (1 or 2).
<ip>	=	This IP address of the external RADIUS server.

This command sets the IP address of the specified external RADIUS server.

18.5.10 acl dot1x radius port Command

Syntax:

```
acl dot1x radius port <index> <port>
```

where

`<index>`	=	The index number of an external RADIUS server entry (1 or 2).
`<port>`	=	The RADIUS server port number.

This command sets the external RADIUS server port number of the specified RADIUS server.

18.5.11 acl dot1x radius secret Command

Syntax:

```
acl dot1x radius secret <index> <secret_key>
```

where

`<index>`	=	The index number of an external RADIUS server entry (1 or 2).
`<secret_key>`	=	The authentication and encryption keys of the specified RADIUS server.

This command sets the authentication and encryption keys of the specified RADIUS server.

18.5.12 acl dot1x show Command

Syntax:

```
acl dot1x show
```

This command displays the status of the IEEE 802.1x feature and the external RADIUS server settings.

```
ras> acl dot1 show
dot1x feature is disable
radius servers:
no ip              port  secret
-- --------------- ----- --------------------------------
 1 0.0.0.0          1812 1234
 2 0.0.0.0          1812 1234
```

18.6 acl maccount Commands

Use `maccount` commands to limit how many MAC addresses may be dynamically learned or statically configured on a DSL port. MAC count commands are listed next.

You cannot enable both MAC count and MAC filtering on the same port at the same time.

18.6.1 acl maccount disable Command

Syntax:

```
acl maccount disable <slot-port>
```

This command disables the MAC count limit on the specified DSL port(s).

The following example turns off the MAC count limit on DSL port 4 on a line card in slot 5.

```
ras> acl maccount disable 5-4
```

18.6.2 acl maccount enable Command

Syntax:

```
acl maccount enable <slot-port>
```

This command enables the MAC count limit on the specified DSL port(s). You can only enable the MAC count filter on DSL ports that do not have the MAC filter enabled.

The following example turns on the MAC count limit on DSL port 4 on a line card in slot 5.

```
ras> acl maccount enable 5-4
```

18.6.3 acl maccount set Command

Syntax:

```
acl maccount set <slot-port> <count>
```

where

`<count>` = Set the limit for how many MAC addresses that a port may dynamically learn. For example, if you are configuring port 2 and you set this field to "5", then only five devices with dynamically learned MAC addresses may access port 2 at any one time. A sixth device would have to wait until one of the five learned MAC addresses ages out.

The valid range is from “1” to “128”.

This command sets the limit for how many MAC addresses may be dynamically learned on the specified DSL port(s).

The following example sets the MAC count filter to allow up to 50 MAC addresses to be dynamically learned on DSL port 4 on the line card in slot 5.

```
ras> acl maccount set 5-4 50
```

18.6.4 acl maccount show Command

Syntax:

```
acl maccount show <slot>
```

This command displays the MAC count settings for the DSL port(s). The following example displays the MAC count settings for slot 5.

```
ras> acl maccount show 5
[slot5] maccount
 port enable count
----- ------ -----
 5- 1   -        5
 5- 2   -        5
 5- 3   -        5
 5- 4   -        5
-------------------------- [ snip ] --------------------------
 5-44   -        5
 5-45   -        5
 5-46   -        5
 5-47   -        5
 5-48   -        5
```

18.7 acl macfilter Commands

Use the MAC filter commands to allow only incoming frames from MAC (Media Access Control) address(es) that you specify. MAC filter commands are listed next. You may specify up to ten MAC addresses per port.

You cannot enable both MAC filtering and MAC count on the same port at the same time.

18.7.1 acl macfilter delete Command

Syntax:

```
acl macfilter delete <slot-port> <mac>
```

where

`<mac>` = The source MAC address in "a0:c5:12:34:56:78" format.

This command removes a configured source MAC address from a line card's specified DSL port.

The following example removes the source MAC address of a0:c5:12:34:56:78 from the MAC filter for ADSL port 5.

```
ras> acl macfilter delete 5-4 a0:c5:12:34:56:78
```

18.7.2 acl macfilter disable Command

Syntax:

```
acl macfilter disable <slot-port>
```

This command turns off the MAC filtering feature on a line card's specified DSL port(s).

The following example turns off the MAC filtering feature on DSL port 4 of the line card in slot 5.

```
ras> acl macfilter disable 5-4
```

18.7.3 acl macfilter enable Command

Syntax:

```
acl macfilter enable <slot-port>
```

This command turns on the MAC filtering feature on a line card's specified DSL port(s).

The following example turns on the MAC filtering feature on DSL port 4 of the line card in slot 5.

```
ras> acl macfilter enable 5-4
```

18.7.4 acl macfilter mode Command

Syntax:

```
acl macfilter mode <slot-port> accept|deny
```

where

`accept|deny` = `accept` Allows frames from MAC addresses that you specify and block frames from other MAC addresses.

`deny` Blocks frames from MAC addresses that you specify and allow frames from other MAC addresses.

18.7.5 acl macfilter set Command

Syntax:

```
acl macfilter set <slot-port> <mac>
```

where

`<mac>` = The source MAC address in "a0:c5:12:34:56:78" format.

This command adds an allowed source MAC address on a line card's specified DSL port or on the DSL port in all of the line cards DSL ports if no slot is specified.

The following example adds source MAC address a0:c5:12:34:56:78 for DSL port 4 of the line card in slot 5.

```
ras> acl macfilter set 5-4 a0:c5:12:34:56:78
```

18.7.6 acl macfilter show Command

Syntax:

```
acl macfilter show <slot>|<slot-port>
```

This command displays the MAC filtering status (V for enabled, - for disabled) and the fixed source MAC addresses on a line card's specified DSL port(s) or on all of the line card's DSL ports if no port is specified.

The following example displays the MAC filtering status on all ports of the line card in slot 2.

```
ras> acl macfilter show 2
 port  mode  enable  mac address
----- ------ ------ -----------------
 2- 1 accept   -
 2- 2 accept   -
 2- 3 accept   -
 2- 4 accept   -
---------------------- Snip ----------------------
 2-45 accept   -
 2-46 accept   -
 2-47 accept   -
 2-48 accept   -
ras>
```

18.8 acl ouifilter Commands

Use the following OUI (Organizationally Unique Identifier) filter commands to filter out packets from devices with the specified OUI in the MAC address field.

The OUI field is the first three octets in a MAC address. An OUI uniquely identifies the manufacturer of a network device and allows you to identify from which device brands the switch will accept traffic or send traffic to. The OUI value is assigned by the IANA.

18.8.1 acl ouifilter disable Command

Syntax:

```
acl ouifilter disable <slot-port>
```

This command deactivates MAC OUI filtering on the port(s) of the specified line card.

18.8.2 acl ouifilter enable Command

Syntax:

```
acl ouifilter enable <slot-port>
```

This command activates MAC OUI filtering on the port(s) of the specified line card.

18.8.3 acl ouifilter mode Command

Syntax:

```
acl ouifilter mode <slot-port> accept|deny
```

where

`accept|deny`	=	`accept` Allows frames from MAC addresses with the OUI(s) that you specify and blocks frames with MAC addresses of other OUIs. `deny` Blocks frames from MAC addresses with the OUI(s) that you specify and allows frames from other MAC addresses.

This command activates MAC OUI filtering on the port(s) of the specified line card. Use the `acl ouifilter set` command to set the OUI value(s).

The following example sets the system to drop packets with the specified OUI value on port 1 of the line card in slot 3.

```
ras> acl ouifilter mode 3-1 deny
```

18.8.4 acl ouifilter set Command

Syntax:

```
acl ouifilter set <slot-port> <mac>
```

where

`<mac>`	=	The first three octets of a MAC address in the format xx:xx:xx. For example, 00:0F:FE.

This command specifies a MAC OUI whose packets you want to filter. Use the `acl ouifilter mode` command to set the action on the matched packets.

The following example sets the system to filter packets with an OUI value of 00-0F-FE on port 1 of the line card in slot 3.

```
ras> acl ouifilter set 3-1 00:0f:fe
```

18.8.5 acl ouifilter show Command

Syntax:

```
acl ouifilter show  <slot>|<slot-port>
```

This command displays the OUI filtering status (V for enabled, - for disabled) and the OUI value(s) of the MAC address on a line card's specified DSL port(s) or on all of the line card's DSL ports if no port is specified. The following example displays the OUI filter setting of port 1 on the line card in slot 3.

```
ras> acl ouifilter show 1-1
 port  mode  enable  mac address
----- ------ ------ -----------------
 1- 1 accept   -
```

18.9 acl pktfilter Commands

Use the following packet filter commands to filter out specific types of packets on specific ports.

18.9.1 acl pktfilter set Command

Syntax:

`acl pktfilter set <slot-port> <type>`

where

<type> = `accept-all` Accept all packet types.

`pppoe-only` Accept only PPPoE packets and reject all other packet types. (Point-to-Point Protocol over Ethernet) relies on PPP and Ethernet. PPPoE is a specification for connecting the users on an Ethernet to the Internet through a common broadband medium, such as a single DSL line, wireless device or cable modem.

Alternatively, you can have the system reject any combination of the following packet types (separated by a space).

`ip` Reject IP packets. Internet Protocol. The underlying protocol for routing packets on the Internet and other TCP/IP-based networks.

`arp` Reject ARP packets. Address Resolution Protocol is a protocol for mapping an Internet Protocol address (IP address) to a physical computer address that is recognized in the local network.

`dhcp` Reject DHCP packets. Dynamic Host Configuration Protocol automatically assigns IP addresses to clients when they log on. DHCP centralizes IP address management on central computers that run the DHCP server program. DHCP leases addresses, for a period of time, which means that past addresses are "recycled" and made available for future reassignment to other systems.

`eapol` Reject EAPol packets. EAP (Extensible Authentication Protocol, RFC 2486) over LAN. EAP is used with IEEE 802.1x to allow additional authentication methods (besides RADIUS) to be deployed with no changes to the access point or the wireless clients.

`pppoe` Reject PPPoE packets.

`netbios` Reject NetBIOS packets. (Network Basic Input/Output System) are TCP or UDP broadcast packets that enable a computer to connect to and communicate with a LAN.

`igmp` Reject IGMP packets. Internet Group Multicast Protocol is used when sending packets to a specific group of hosts.

This command sets the packet type filter for the specified ADSL port(s).

The following example sets DSL port 4 of the line card in slot 5 to reject ARP, PPPoE and IGMP packets.

```
ras> acl pktfilter set 5-4 arp pppoe igmp
```

18.9.2 acl pktfilter show Command

Syntax:

`acl pktfilter show <slot>`

This command displays the packet type filter settings on the specified line card's DSL port(s).

The following example displays the packet type filter settings for the DSL ports of the line card in slot 5.

```
ras> acl pktfilter show 5
 port filter
----- ------------------------------------
 5- 1 accept-all
 5- 2 accept-all
 5- 3 accept-all
------------------------- [ snip ] --------------------------
 5-45 accept-all
 5-46 accept-all
 5-47 accept-all
 5-48 accept-all
```

18.10 PPPoE Agent Information

Similar to DHCP relay option82, you can set the switch to insert line information into client PPPoE Active Discovery Initialization (PADI) packets. This allows a PPPoE termination server to identify and authenticate a PPPoE client based on the specified information (such as the ISP name or line card number).

18.10.1 acl pppoeagent clearinfo Command

Syntax:

`acl pppoeagent clearinfo <vid>`

This command resets the PPPoE line description for subscribers in the specified VLAN.

18.10.2 acl pppoeagent enable Command

Syntax:

```
acl pppoeagent enable <vid>
```

This command turns on PPPoE line information for subscribers in the specified VLAN. The switch adds line information to PPPoE discover packets for user authentication and identification.

The following example activates the PPPoE agent setting for VLAN 10.

```
ras> acl pppoeagent enable 10
```

18.10.3 acl pppoeagent delete Command

Syntax:

```
acl pppoeagent delete <vid>
```

This command removes PPPoE line information setting for the specified VLAN.

18.10.4 acl pppoeagent disable Command

Syntax:

```
acl pppoeagent disable <vid>
```

This command sets the switch to not add line information in PPPoE discover packets.

18.10.5 acl pppoeagent info Command

Syntax:

```
acl pppoeagent info <vid> <description>
```

This command specifies the PPPoE line information the switch is to add to PPPoE discover packets from the specified VLAN. Enter a description (up to 24 alphanumerical characters).

Before you can configure PPPoE agent information, you must first create a entry using the `acl pppoeagent set` command.

The following example sets the switch to add “testing” as the line information to PPPoE discover packets on VLAN 10.

```
ras> acl pppoeagent set 10
ras> acl pppoeagent enable 10
ras> acl pppoeagent info 10 testing
ras> acl pppoeagent show
vid  en    info
---- ----- ------------------------
10     V   testing
vlan set: 1
ras>
```

18.10.6 acl pppoeagent set Command

Syntax:

```
acl pppoeagent set <vid>
```

This command creates a PPPoE agent information entry for the VLAN. After you have created an entry for a VLAN, you can configure the line information settings. The following example creates an entry for VLAN 10.

```
ras> acl pppoeagent set 10
```

18.10.7 acl pppoeagent show Command

Syntax:

```
acl pppoeagent show
```

This command displays PPPoE line information settings. The following figure shows the PPPoE agent setting for VLAN 10.

```
ras> acl pppoeagent show
vid  en    info
---- ----- ------------------------
10     V   testing
vlan set: 1
ras>
```

18.11 acl rule Commands

Use the `acl rule` commands to apply ACL profiles (you created using the `profile acl` commands) on the PVCs.

18.11.1 acl rule delete Command

Syntax:

```
acl rule delete <slot-port-vpi/vci> <profile>
```

where

<profile> = Name of an access control profile.

This command allows you to remove an access control settings from the specified PVC.

18.11.2 acl rule set Command

Syntax:

```
acl rule set <slot-port-vpi/vci> <profile>
```

where

<profile> = Name of an access control profile.

This command allows you to apply an access control profile to the specified DSL link(s). You can apply up to eight profiles to a subscriber port.

The following example applies the “example” rule to PVC.

```
ras> acl rule set 3-1-0/33 example
```

18.11.3 acl rule show Command

Syntax:

```
acl rule show <slot-port-vpi/vci>
```

This command displays the current access control rule assignment settings. The following figure shows an example.

```
ras> acl rule show 3-1-0/33
pvc            profile
-------------- --------------------------------
3-1-0/33       example
ras>
```

19

alarm Commands

This chapter describes the alarm management commands.

19.1 alarm Commands Summary

The following table lists the `alarm` commands. The **P** column on the right indicates the administrator privilege level needed to use the command (**H** for high, **M** for middle or **L** for low).

Table 159 alarm Commands

COMMAND				DESCRIPTION	P
`alarm`				Alarm command general parameters: `<alarm>` = alarm category (eqpt, dsl, enet, sys or all) `<severity>` = alarm severity level (critical, major, minor, info or all) `<condition>` = Specify an alarm condition.	
	`clear`			Erases historic alarm entries.	M
	`cutoff`			Cancels an alarm. This stops the sending of the alarm signal current.	M
	`edit`	`<alarm>|all <fac> <target>[,<target>]`		Edits an alarm report entry. `<fac> = local1~local7` `<target> = snmp|syslog|all|none` 'none' disables alarm reports on this alarm category.	M
	`xedit`	`<alarm> <cond> <severity> <fac> <target>[,<target>] <clearable>`		Sets the severity level of an alarm(s) and where the system is to send the alarm(s). <cond> = <condition>|<code>|all `<target> = snmp|syslog|all|none` 'none' disables alarm reports on this alarm category. <clearable> = clearable|unclearable	M
	`history`	`clear`	`<alarm>|all <condition>|all`	Removes historic alarm entries by alarm category and alarm condition or by severity.	M
		`clear`	`<severity>`		

Table 159 alarm Commands (continued)

COMMAND				DESCRIPTION	P
		show	[<severity>|all] [<alarm>|all] [<condition>|all] [<sdate>|all] [<edate>|all] [for|rev] [detail]	Displays historic alarms by severity, alarm category and alarm condition. You can also display detailed alarms.	L
	port	show	<slot>	Displays port alarm severity level thresholds.	L
		set	all|mgmt|<giga-port>|<slot-port> <severity>	Sets the severity of alarms to record for individual ports.	M
	show	[<severity>|all] [<alarm>|all] [<condition>|all] [<sdate>|all] [<edate>|all] [for|rev] [detail]		Displays current alarms by severity, alarm category or alarm condition. You can also display detailed alarms.	L
	tablelist	[<alarm>|all] [<severity>|all] [<fac>|all] [<target>[,<target>]] [<condition>|all]		Displays the supported alarm list and report settings. <fac> = local1~local7 <target> = snmp|syslog|all	L

19.2 General alarm Command Parameters

The following table describes commonly used `alarm` command parameter notation.

Table 160 General alarm Command Parameters

NOTATION	DESCRIPTION
<alarm>	Specify a category of alarms. `eqpt` represents equipment alarms. `dsl` represents Digital Subscriber Line (DSL) alarms. `enet` represents Ethernet alarms. `sys` represents system alarms. `all` specifies every alarm category.
<severity>	Specify an alarm severity level (`critical`, `major`, `minor`, `info` or `all`).
<condition>	Specify an alarm condition.
<sdate>	Specify a start date in yyyy/mm/dd format.
<edate>	Specify an end date in yyyy/mm/dd format.
for|rev	Specify the displaying order. for = forward, rev = reverse
[detail]	Display more comprehensive alarm condition descriptions.

19.3 alarm Commands

Use these commands to view and clear alarms. You can also set the device to report alarms to an SNMP or syslog server that you specify.

19.3.1 alarm clear Command

Syntax:

```
alarm clear
```

This command erases (clearable) historic alarm entries.

19.3.2 alarm cutoff Command

Syntax:

```
alarm cutoff
```

This command cancels an alarm. This stops the sending of the alarm signal current. This is useful in stopping an alarm if you have the alarm output connector pins connected to a visible or audible alarm. The alarm entry remains in the system.

19.3.3 alarm edit Command

Syntax:

```
alarm edit <alarm> <fac> <target>[,<target>]
```

where

`<fac>`	=	The log facility (`local1~local7`) that has the device log the syslog messages to different files in the syslog server. See your syslog program's documentation for details.
`<target>`	=	`snmp|syslog|all|none` The type of alarm messages that the device is to send (SNMP, syslog or all). `none` disables alarm reports on this alarm category.

This command creates or edits an alarm report entry.

The following example creates an alarm report entry that sends system alarms to an SNMP server at the local 3 log facility.

```
ras> alarm edit sys local3 snmp
```

19.3.4 alarm history clear Command

Syntax:

```
alarm history clear [<alarm>|all <condition>|all] <severity>
```

This command removes historic alarm entries by alarm category, alarm condition or severity.

The following example removes the historic minor level alarms for all alarm categories, and all conditions.

```
ras> alarm history clear minor
```

19.3.5 alarm history show Command

Syntax:

```
alarm history show [<severity>|all] [<alarm>|all] [<condition>|all]
[<sdate>|all] [<edate>|all] [for|rev] [detail]
```

This command displays historic alarms by severity, alarm category or alarm condition.

The following example displays the historic major level alarms for all alarm categories, and all conditions.

```
ras> alarm history show major
    no alarm   condition                severity timestamp      source
------ ------  ----------------------- -------- -------------- -------
     1 eqpt   +LT_INACTIVE              major    09/09 09:38:54 slot 4
     2 eqpt   +LT_INACTIVE              major    09/09 09:38:54 slot 9
     3 eqpt   -LT_INACTIVE              major    09/09 09:39:25 slot 4
     4 eqpt   -LT_INACTIVE              major    09/09 09:39:28 slot 9
```

19.3.6 alarm port set Command

Syntax:

```
alarm port set  all|mgmt|<giga-port>|<slot-port> <severity>
```

where

<fac>	=	The log facility (local1~local7) that has the device log the syslog messages to different files in the syslog server. See your syslog program's documentation for details.
<target>	=	snmp|syslog|all|none The type of alarm messages that the device is to send (SNMP, syslog or all). none disables alarm reports on this alarm category.

This command sets the alarm severity threshold for recording alarms on an individual port(s). The system reports an alarm on a port if the alarm has a severity equal to or higher than the port's threshold.

The following example has the systems only record critical alarms on DSL port 7 on the line card in slot 4.

```
ras> alarm port set 4-7 critical
```

19.3.7 alarm port show Command

Syntax:

```
alarm port show <slot>
```

where

`<fac>`	=	The log facility (`local1~local7`) that has the device log the syslog messages to different files in the syslog server. See your syslog program's documentation for details.
`<target>`	=	`snmp|syslog|all|none` The type of alarm messages that the device is to send (SNMP, syslog or all). `none` disables alarm reports on this alarm category.

This command displays port alarm severity level thresholds. The system reports an alarm on a port if the alarm has a severity equal to or higher than the port's threshold.

The following example displays the port alarm thresholds for the ports on the line card in slot 4. "ifindex" identifies the interface.

```
ras> alarm port show 4

  ifindex       severity
----------    -----------
  4- 1           minor
  4- 2           minor
  4- 3           minor
-------------------------- [ snip ] --------------------------
  4-44           minor
  4-45           minor
  4-46           minor
  4-47           minor
  4-48           minor
```

19.3.8 alarm show Command

Syntax:

```
alarm show [<severity>|all] [<alarm>|all] [<condition>|all] [<sdate>|all]
[<edate>|all] [for|rev] [detail]
```

where

`[detail]`	=	Display in depth alarm information.

This command displays the current alarms by severity, alarm category or alarm condition.

The following example displays the critical level alarms for all alarm categories and conditions.

```
ras> alarm show critical all
[current card alarm]
id  state     card type       heat vol mon down out
--- --------- --------------- ---------------------
 1  standby   MSC1000G          -   -   -    -   -
 2  active    MSC1000G          -   -   -    -   -
 3  -                           -   -   -    -   -
 4  -         ALC1248G-53       -   -   -    V   V
 5  active    ALC1248G-53       -   -   -    -   -
 6  -                           -   -   -    -   -
 7  -         ALC1248G-51       -   -   -    V   V
 8  -                           -   -   -    -   -
 9  -         ALC1248G-53       -   -   -    V   V
10  -         ALC1248G-53       -   -   -    V   V

[current alarm list]
    no alarm   condition                 severity timestamp      source
------ ------  ----------------------- -------- -------------- -----------
---
     1 eqpt   +FAN_ERROR               critical 12/14 13:46:41 slot 2
     2 eqpt   +FAN_ERROR               critical 12/14 13:46:41 slot 2
     3 eqpt   +FAN_ERROR               critical 12/14 13:46:41 slot 2
     4 eqpt   +FAN_ERROR               critical 12/14 13:46:41 slot 2
     5 eqpt   +FAN_ERROR               critical 12/14 13:46:41 slot 2
     6 eqpt   +FAN_ERROR               critical 12/14 13:46:41 slot 2
     7 eqpt   +DC_POWER_FAIL           critical 12/14 13:46:21 slot 2
```

19.3.9 alarm tablelist Command

Syntax:

```
alarm tablelist [<alarm>|all] [<severity>|all]
[<fac>|all][<target>[,<target>]] [<condition>|all]
```

where

- `<fac>` = The log facility (`local1~local7`) that has the device log the syslog messages to different files in the syslog server. See your syslog program's documentation for details.
- `<target>` = `snmp|syslog|all` The type of alarm messages that the device is to send (SNMP, syslog or all).

This command displays the supported alarm list and report settings.

The following example displays the supported alarms for all alarm levels, all alarm categories, all facilities, all types of alarm messages and all conditions.

```
ras> alarm tablelist
 no alarm       (code)condition        facility snmp syslog severity
clearable
--- ------ ------------------------  --------- ---- ------ -------- -------
  1   dsl  ( 5002)LINE_UP             local1    V     V    info       -
  2   dsl  ( 5003)LINE_DOWN           local1    V     V    minor      V
  3   dsl  ( 5006)LINE_LDM_START      local1    V     V    info       -
  4   dsl  ( 5007)LINE_LDM_END        local1    V     V    info       -
  5   dsl  ( 5008)LINE_PM_L2          local1    V     V    info       -
  6   dsl  ( 5009)LINE_PM_L0          local1    V     V    info       -
  7   dsl  ( 5010)LINE_FAIL           local1    V     V    major      -
  8   dsl  ( 5013)ADSL_TCA_LOL        local1    V     V    info       V
  9   dsl  ( 5016)ADSL_TCA_LOF        local1    V     V    info       V
 10   dsl  ( 5017)ADSL_TCA_LOS        local1    V     V    info       V
 11   dsl  ( 5018)ADSL_TCA_LPR        local1    V     V    info       V
 12   dsl  ( 5019)ADSL_TCA_ES         local1    V     V    info       V
 13   dsl  ( 5020)ADSL_RATE_CHANG     local1    V     V    info       V
 14   dsl  ( 5021)ADSL_TCA_SES        local1    V     V    info       V
 15   dsl  ( 5022)ADSL_TCA_UAS        local1    V     V    info       V
 16   dsl  ( 5023)SHDSL_TCA_ATTEN     local1    V     V    info       V
 17   dsl  ( 5024)SHDSL_TCA_SNRM      local1    V     V    info       V
 18   dsl  ( 5025)SHDSL_TCA_ES        local1    V     V    info       V
 19   dsl  ( 5026)SHDSL_TCA_SES       local1    V     V    info       V

    Press any key to continue, 'e' to exit, 'n' for nopause
```

19.3.10 alarm xedit Command

Syntax:

`alarm xedit <alarm> <cond> <severity> <fac> <target>[,<target>] <clearable>`

where

`<cond>` = `<condition>|<code>|all`

The condition is the text description for the condition under which the alarm applies. Use the `alarm tablelist` command to find alarm conditions.

The condition code is the number of a specific alarm message. Use the `alarm tablelist` command to find alarm condition codes.

`<fac>` = The log facility (`local1~local7`) that has the device log the syslog messages to different files in the syslog server. See your syslog program's documentation for details.

`<target>` = `snmp|syslog|all|none` The type of alarm messages that the device is to send (SNMP, syslog or all). `none` disables alarm reports on this alarm category.

`<clearable>` = `clearable|unclearable` This sets whether or not the alarm can be manually cleared from the system.

This command sets the severity level of an alarm(s) and where the system is to send the alarm(s). You can also set whether or not the alarm can be manually cleared from the system.

Use the `alarm tablelist` command to display alarm setting details.

The following example creates an alarm report entry that sets all system alarms to the major severity level and sends them to a syslog server at the local 3 log facility. It also sets the system alarms to be manually clearable.

```
ras> alarm xedit sys all major local3 syslog clearable
```

20

clear Commands

This chapter describes the clear commands that you use to reset the various system counters.

20.1 clear Commands Summary

The following table lists the clear commands you can use to reset the counters. Once you reset a counter, you can only display new counter information using the `show` command.

Table 161 clear Commands

COMMAND				DESCRIPTION	P
`clear`					
	`atm`	`<slot-port>|<slot-port-vpi/vci>`		Resets ATM counters on the specified port or PVC.	M
	`dhcp`	`counter <slot-port>`		Resets DHCP counters.	M
	`enet`	`<giga-port>|<slot>`		Resets counters on the Ethernet port.	M
	`igmp`	`info`		Resets IGMP counters and the number of learned IGMP groups.	M
		`port info`	`<slot-port>`	Resets the counter of IGMP packets received and the number of learned groups on a port.	M
	`ip`	`inband|outband|both`		Resets management counters.	M
	`lineperf`	`<slot-port>`		Resets subscriber line performance counters.	M
	`packet`	`<slot-port>|<slot-port-vpi/vci>`		Resets the packet transmission counters on a subscriber port or PVC.	M
	`paepvc`	`counter`	`<slot-port>|<slot-port-vpi/vci>`	Resets the PAE PVC counters.	M
	`performance`	`<slot-port> curr|15min|1day`		Resets subscriber line performance counters.	M

20.2 clear Command Example

The following example resets the IGMP counters on the system. This clears the IGMP counters and the number of IGMP groups learned.

```
ras> clear igmp info
```

21

cluster Commands

This chapter describes the cluster management commands.

21.1 cluster commands Summary

The following table lists the `cluster` commands. The **P** column on the right indicates the administrator privilege level needed to use the command (**H** for high, **M** for middle or **L** for low).

Table 162 cluster Commands

COMMAND				DESCRIPTION	P
`cluster`					
	`disable`			Disable clustering, default is disabled	M
	`enable`	`manager <name>`		Enable device as cluster manager	M
		`member <password>`		Enable device as cluster member	M
	`login`	`<id>`		Login into a client	M
	`member`	`candidate`	`show`	List all available candidates	M
			`flush`	Flush current candidates	M
		`delete`	`<id>`	Removes a member from a cluster.	M
		`set`	`<id> <mac> <password>`	Adds a member to the cluster.	M
		`show`		Displays cluster member settings.	L
	`show`			Displays the cluster member status.	L
	`vlan`	`<vid>`		Sets the cluster VLAN ID.	M

21.1.1 cluster disable Command

Syntax:

```
cluster disable
```

This command sets this DSLAM to not function as part of the cluster.

21.1.2 cluster enable manager Command

Syntax:

```
cluster enable manager <name>
```

where

`<name>`	=	A name to identify the cluster. You may use up to 32 printable characters. Spaces are not allowed.

This command sets this DSLAM as the cluster manager DSLAM. A cluster can only have one manager. Other cluster managers do not display in the cluster candidate list.

The following example sets the DSLAM to be the cluster manager and use “Manager-A” as the cluster name.

```
ras> cluster enable manager Manager-A
```

21.1.3 cluster enable member Command

Syntax:

```
cluster enable member <password>
```

where

`<password>`	=	Type the cluster member’s management password. If the administrator changes the device’s management password afterwards, then it cannot be managed from the cluster manager.

This command sets this DSLAM to be a cluster member. The device will display in the cluster candidate list.

The following example sets the DSLAM to be a cluster member. The DSLAM’s management password is “1234”.

```
ras> cluster enable member 1234
```

21.1.4 cluster login Command

Syntax:

```
cluster login <id>
```

where

`<id>`	=	The member’s ID number (2~8).

This command lets you open the DSLAM’s CLI via the cluster manager DSLAM.

The following is an example. After you log into a cluster member, the cluster name and the member's ID number display in the command prompt.

```
ras> cluster login 2
Copyright (c) 1994 - 2006 ZyXEL Communications Corp.
IES6000:2>
```

21.1.5 cluster member candidate show Command

Syntax:

```
cluster member candidate show
```

This command displays potential cluster member DSLAMs that were found by auto-discovery. The DSLAMs must be directly connected and in the same VLAN group. You must have also logged into that device and configured it as a cluster member.

A device can only be part of one cluster at a time. If a device is already in another cluster, it does not display here. Devices that are set to be cluster managers will not be visible.

21.1.6 cluster member candidate flush Command

Syntax:

```
cluster member candidate flush
```

This command updates the list of suitable candidates found by auto-discovery.

21.1.7 cluster member delete Command

Syntax:

```
cluster member delete <id>
```

where

`<id>` = The member's ID number (2~8).

This command removes the specified cluster member from the cluster.

The following example removes the cluster member DSLAM with ID 3 from the cluster.

```
ras> cluster member delete 3
```

21.1.8 cluster member set Command

Syntax:

```
cluster member set <id> <mac> <password>
```

where

`<id>` = An ID number (2~8) for the cluster member.

<mac>	=	The hardware MAC address of the device
<password>	=	The cluster member's management password. If the administrator changes the device's management password afterwards, then it cannot be managed from the cluster manager.

This command adds the specified cluster member to the cluster.

The following example adds a DSLAM as cluster member 4. The DSLAM's MAC address is "00:13:49:d1:d0:cd" and its password is "1234".

```
ras> cluster member set 4 00:13:49:d1:d0:cd 1234
```

21.1.9 cluster member show Command

Syntax:

```
cluster member show
```

This command displays a list of the cluster members. ID 1 is the cluster manager.

The following is an example.

```
ras> cluster member show
member list:
id mac
-- -----------------
 1 00:13:49:d1:d0:bc
 2 -
 3 -
 4 -
 5 -
 6 -
 7 -
 8 -
```

21.1.10 cluster show Command

Syntax:

```
cluster show
```

This command displays status information about the cluster.

The following is an example.

```
ras> cluster show
mode          :manager
vlan          :4094
name          :Manager-A
member list:
id state    hostname        uptime        model            mac
-- -------- --------------- ------------- ---------------- -----------------
 1 active                       02:20:38 IES-5000         00:13:49:d1:d0:bc
 2 -
 3 -
 4 -
 5 -
 6 -
 7 -
 8 -
```

where

`mode`	=	Whether this device is the manager of the cluster or a member.
`vlan`	=	This is the VLAN ID that the cluster uses and is only applicable if the manager DSLAM is set to use IEEE 802.1Q VLAN. All DSLAMs must be directly connected and in the same VLAN group to belong to the same cluster. This field is ignored if the clustering manager is using port-based VLAN.
`name`	=	This is the name of the cluster.
`member list`	=	This table lists the DSLAMs that belong to the cluster.
`id`	=	The DSLAM's ID number in the cluster. 1 is the cluster manager.
`state`	=	This column displays the status of this DSLAM within the cluster. **active**: the member is fine. **inactive**: the manager can not communicate the member. **waiting**: the manager has sent a command to add the member and is waiting for a response. **error**: the member reported that the password was wrong.
`hostname`	=	This is the cluster DSLAM's system name.
`uptime`	=	This is how long the DSLAM has been turned on and in the cluster.
`model`	=	This field displays the model name of the DSLAM.
`mac`	=	This is the DSLAM's hardware MAC address.

21.1.11 cluster vlan Command

Syntax:

```
cluster vlan <vid>
```

where

<vid>	=	This is the cluster management VLAN ID. The cluster's DSLAMs must be directly connected and in the same VLAN group. The cluster management VID must be different from the management VID.

This command sets the VLAN ID for the cluster.

The following example sets the cluster VID to 79.

```
ras> cluster vlan 79
```

21.2 Cluster Member Firmware and Configuration File Management

You can use FTP to upload firmware to a cluster member through the cluster manager. You can also upload or download configuration files. The following example shows uploading MSC1000G firmware to cluster member 2. See Chapter 33 on page 585 for more on uploading firmware and uploading or downloading configuration files.

Figure 190 FTP Upload to a Cluster Member Example

```
C:\>ftp 172.23.19.228
Connected to 172.23.19.228.
220  FTP version 1.0 ready at Fri Nov 10 10:53:52 2006
User (172.23.19.228:(none)): admin
331 Enter PASS command
Password:
230 Logged in
226 File sent OK
ftp> bin
200 Type I OK
ftp> cd member-2
257 "/node-2" is current directory
ftp> put 370AIN0b5.bin
200 Port command okay
150 Opening data connection for STOR ras
226 File received OK
ftp: 3558910 bytes sent in 3.89Seconds 914.65Kbytes/sec.
ftp>
```

The following table explains some of the FTP parameters.

Table 163 FTP Upload to a Cluster Member Example

FTP PARAMETER	DESCRIPTION
User	Enter "admin".
Password	The web configurator password default is 1234.
bin	Changes the transfer mode to binary.

Table 163 FTP Upload to a Cluster Member Example (continued)

FTP PARAMETER	DESCRIPTION
`V3.70(ABF.0)b5`	This is the name of the firmware file you want to upload to the cluster member.
`cd member-2`	Use “cd member-” and the index number of the cluster member to which you want to upload firmware. This index number matches the member’s number in the

22

config Commands

This chapter describes the configuration file management commands.

22.1 config Commands Summary

The following table lists the `config` commands. The **P** column on the right indicates the administrator privilege level needed to use the command (**H** for high, **M** for middle or **L** for low).

Table 164 config Commands

COMMAND				DESCRIPTION	P
`config`					
	`default`			Resets factory default configuration.	H
	`save`			Saves current configuration to non-volatile memory.	M
	`show`	`sys|ip|switch|port|profile|acl|vlan|multicast|all [nopause]`		Displays the current configuration.	L

22.1.1 config default Command

Syntax:

```
ras> config default
```

This command resets the system to the factory default configuration. The system restarts with the factory default settings.

Do not turn off your device while returning to the default configuration.

22.1.2 config save Command

Syntax:

```
ras> config save
```

This command saves your configuration when you are done with a configuration session. This command saves all system configuration to nonvolatile memory. You must use this command to save any configuration changes that you make, otherwise the system returns to its previously saved settings when it is restarted. Save your changes after each configuration session.

Nonvolatile memory refers to the MSC1000G's storage that remains even if the power is turned off. Configuration saved in the run time (volatile) memory is lost when the power is turned off.

Do NOT turn off your device while saving your configuration.

22.1.3 config show Command

Syntax:

```
ras> config show sys|ip|switch|port|profile|acl|vlan|multicast|all [nopause]
```

This command shows the configuration of the specified category. `nopause` allows you to show all settings at one time so you do not need to press a key to continue.

An example is shown next.

```
ras> config show ip nopause
================= ip ======================================
================= ip/show ====================
interface   interface ip     netmask       vid
--------- --------------- --------------- ----
inband    172.23.15.86    255.255.255.0      1
outband   192.168.0.1     255.255.255.0      -
gateway: 172.23.15.254

================= ip/arp ====================
ip address       time ether address     interface
--------------- ----- ----------------- ----------
172.23.14.10      240 00:0d:60:cb:cc:ae inband
172.23.14.12      270 00:0e:7f:a8:90:13 inband
172.23.14.16      260 00:0d:60:cb:22:4c inband
172.23.14.19      290 00:0e:7f:a9:80:70 inband
172.23.14.35      260 00:a0:c5:b2:6a:43 inband
172.23.14.91      240 00:0a:e4:0a:76:21 inband
172.23.14.99      270 00:0b:cd:fc:30:45 inband
172.23.14.250     270 00:a0:c5:8e:9d:16 inband
172.23.15.172     300 02:0e:a6:89:41:60 inband
172.23.15.254     300 00:04:80:9b:78:00 inband
arp entry: 18

================= ip/route ==================
dest                interface  gateway         metric name
------------------ ---------- --------------- ------ ----------------
192.168.0.0/24     outband    192.168.0.1          1 -
172.23.15.0/24     inband     172.23.15.86         1 -
default            inband     172.23.15.254        1 -
```

23

diagnostic Commands

This chapter describes the `diagnostic` commands.

23.1 diagnostic Commands Summary

The following table lists the `diagnostic` commands. The **P** column on the right indicates the administrator privilege level needed to use the command (**H** for high, **M** for middle or **L** for low).

Table 165 diagnostic Commands

COMMAND				DESCRIPTION	P
`diagnostic`					
	`ldm`			A Loop Diagnostic Mode test provides details about the condition of an ADSL line. This feature is applicable for ALC line cards only.	
		`show`	`<slot-port> result|hlin|hlog|qln|snr`	Displays the most recent loop diagnostic mode test results for the specified subscriber port.	M
		`test`	`<slot-port>`	Sets the specified subscriber port to loop diagnostic mode and displays the results.	M
	`loopback`	`f5`	`<slot-port-vpi/vci>`	Performs an OAMF5 loopback test on the specified subscriber port or PVC.	M
	`selt`	`test`	`<slot-port>`	This feature is applicable for ALC line cards only. Single End Loop Test (SELT) checks the distance to the subscriber's location. Note: The port must have an open loop. There cannot be a DSL device, phone, fax machine or other device connected to the subscriber's end of the telephone line. Starts SELT on the port.	M
		`show`	`<slot-port>`	Displays the SELT result (such as line type and loop length).	M

23.2 diagnostic Commands

Use these commands to execute a specified diagnostic or test function to an interface port or a subscriber port.

23.2.1 diagnostic ldm show Command

Syntax:

```
diagnostic ldm show <slot-port> result|hlin|hlog|qln|snr
```

where

`result`	=	Displays the basic loop diagnostic mode test results.
`hlin`	=	Displays the channel characteristics function represented in linear format by a scale factor and a complex number. These are the maximum upstream and downstream scale factors used in producing the channel characteristics function.
`hlog`	=	Displays channel characteristics. The format provides magnitude values in a logarithmic scale. This can be used in analyzing the physical condition of the ADSL line.
`qln`	=	Displays the Quiet Line Noise for a DMT tone is the rms (root mean square) level of the noise present on the line, when no ADSL signals are present. It is measured in dBm/Hz. The QLN can be used in analyzing crosstalk.
`snr`	=	Displays the upstream and downstream Signal to Noise Ratio (in dB). A DMT tone's SNR is the ratio between the received signal power and the received noise power. The SNR can be used in analyzing time dependent changes in crosstalk levels and line attenuation (such as those caused by temperature variations and moisture).

Use this command to display the most recent loop diagnostic mode test results for an ADSL port. Use the loop diagnostics results to analyze problems with the physical ADSL line.

Wait at least one minute after using the `diagnostic ldm test` command before using the `diagnostic ldm show` command.

The following example performs loop diagnostics on DSL port 4 of the line card in slot 5.

The command then displays the results of the ADSL port loop diagnostics.

```
ras> diagnostic ldm show 5-4 result
port 5-4:
                              near end      far end
                            ------------  ------------
  attainable bit rate(kpbs):         1420         26060
  loop attenuation(dB)     :          1.6           0.0
  signal attenuation(dB)   :          0.5           0.0
  snr margin(dB)           : out of range  out of range
  actual tx power fe(dBm)  :         11.7          10.1
```

23.2.2 diagnostic ldm test Command

Syntax:

```
diagnostic ldm test <slot-port>
```

This command has the system perform a Loop Diagnostic Mode test. This is a Dual End Loop Test (DELT). It provides details about the condition of the specified ADSL port's line. The ADSL port must be set to ADSL2 or ADSL2+ ADSL operational mode and have a connection. Use the loop diagnostics results to analyze problems with the physical ADSL line. The subscriber device must also support DELT in order to perform this. This feature is applicable for ALC line cards only.

It takes about one minute for the loop diagnostics to finish.

The following example performs loop diagnostics on DSL port 4 of the line card in slot 5. The command then displays the results of the ADSL port loop diagnostics.

```
ras>  diagnostic ldm test 7-5
```

23.2.3 diagnostic loopback f5 Command

Syntax:

```
diagnostic loopback f5 <slot-port-vpi/vci>
```

This command has the system perform an OAMF5 loopback test on the specified virtual circuit. An Operational, Administration and Maintenance Function 5 (OAMF5) test is used to test the connection between two DSL devices. First, the DSL devices establish a virtual circuit. Then the local device sends an ATM F5 cell to be returned by the remote DSL device (both DSL devices must support ATM F5 in order to use this test).

The following example has the system perform a local loopback test on a virtual circuit on DSL port 5 of the line card in slot 7. The virtual circuit is identified by VPI 0 and VCI 33.

```
ras> diagnostic loopback f5 7-5-0/33
line 1 oam loopback success!
```

23.2.4 diagnostic selt show Command

Syntax:

```
diagnostic selt show <slot>|<slot-port>
```

This command displays the Single End Loop Test (SELT) result after you have performed a SELT test on the specified port on the line card. The report tells you what gauge of telephone wire is connected to the port and the approximate length of the line measured both in meters (m) and thousands of feet (Kft).

23.2.5 diagnostic selt test Command

Syntax:

```
diagnostic selt test <slot-port>
```

This command starts the Single End Loop Test (SELT) on the specified port on the line card. This test checks the distance to the subscriber's location.

The port must have an open loop. There cannot be a DSL device, phone, fax machine or other device connected to the subscriber's end of the telephone line.

24

ip Commands

This chapter shows you how to use the `ip` commands to configure the IP (Internet Protocol) parameters.

24.1 ip Commands Summary

The following table lists the `ip` commands. The **P** column on the right indicates the administrator privilege level needed to use the command (**H** for high, **M** for middle or **L** for low).

Table 166 ip Commands

COMMAND				DESCRIPTION	P
`ip`					
	`arp`	`flush`		Clears the device's IP Address Resolution Protocol table.	M
		`show`		Displays the device's IP Address Resolution Protocol table.	L
	`gateway`	`<ip>`		Sets the default gateway IP address.	M
	`ping`	`<ip> [<count>]`		Pings a host (default 3 times) <count> = number of pings.	L
	`route`	`delete`	`<dst-ip>[/ <netmask>] <gateway>`	Removes a routing table entry.	M
		`set`	`<dst-ip>[/ <netmask>] <gateway-ip> [<metric>] [<name>]`	Adds or modifies a route entry. `<gateway-ip>` = a gateway IP address of '0.0.0.0/0' means a default gateway.	M
		`show`		Displays the routing table.	L
	`show`			Displays the IP addresses of the in-band and out-of-band management interfaces and the default gateway, as well as the in-band management VLAN ID.	L

Table 166 ip Commands (continued)

COMMAND				DESCRIPTION	P
	set	inband|outband <ip>[/<netmask>] [<inband-vid>]		Sets the management IP address, subnet mask and in-band management VLAN ID. <ip> = '0.0.0.0' disables a management interface.	M
	tracert	<ip>		Sends a traceroute packet to the IP address (in the field to the left) and uses the response to determine the path a packet takes to that IP address.	L

24.2 ip Commands

The following shows general IP commands that help with the management of the IP parameters.

24.2.1 ip arp flush Command

Syntax:

```
ras> ip arp flush
```

This command clears the MSC1000G's IP Address Resolution Protocol (ARP) table.

24.2.2 ip arp show Command

Syntax:

```
ras> ip arp show
```

This command displays the MSC1000G's IP Address Resolution Protocol (ARP) table. This is the list of IP addresses and matching MAC addresses that the device has resolved.

An example is shown next.

```
ras> ip arp show
ip address       time ether address     interface
---------------- ----- ----------------- ----------
172.23.14.65       300 00:00:86:47:11:91 outband
172.23.15.172      300 02:0e:a6:89:41:60 outband
172.23.15.254      300 00:04:80:9b:78:00 outband
arp entry: 3
```

24.2.3 ip gateway Command

Syntax:

```
ras> ip gateway <ip>
```

This command sets the system's default gateway IP address.

The following example sets the system to use 172.23.15.254 as the default gateway.

```
ras> ip gateway  172.23.15.254
```

24.2.4 ip ping Command

Syntax:

```
ras> ip ping <ip> [<count>]
```

where

<ip>	=	The IP address of the target.
[<count>]	=	The number of pings you want the MSC1000G to send.

This is an IP facility to check for network functionality by sending an echo request to another IP host and waiting for the reply.

The following example has the MSC1000G send 4 pings to IP address 172.23.19.254.

```
ras> ip ping 172.23.19.254 4
pinging 172.23.19.254 with 32 bytes of data:

reply from 172.23.19.254: bytes=32 time<1ms
reply from 172.23.19.254: bytes=32 time<1ms
reply from 172.23.19.254: bytes=32 time<1ms
reply from 172.23.19.254: bytes=32 time<1ms
```

24.2.5 ip route delete Command

Syntax:

```
ras> ip route delete  <dst-ip>[/<netmask>] <gateway>
```

where

<dst ip>	=	The destination IP address of packets to which this static route applies.
[/netmask]	=	The destination subnet mask of packets to which this static route applies.
<gateway>	=	The IP address of the gateway that you want to send the packets through.

This command removes a static, IP forwarding route.

The following example removes a static route for destination IP address 172.23.19.233 through a gateway at IP address 172.23.15.253.

```
ras> ip route delete 172.23.19.233 172.23.15.253
```

24.2.6 ip route set Command

Syntax:

```
ras> ip route set  <dst-ip>[/<netmask>] <gateway-ip> [<metric>] [<name>]
```

where

<dst ip>	=	The destination IP address of packets that this static route is to route.
[/<netmask>]	=	The destination subnet mask of packets that this static route is to route.
<gateway-ip>	=	The IP address of the gateway that you want to send the packets through.
[<metric>]	=	The metric (hop count) of this static route.
[<name>]	=	A name to identify this static route. Up to 31 English keyboard characters. Spaces and tabs are not allowed.

This command defines a new, static IP forwarding route or edits an existing one.

The following example creates a static route named “Bob” to send traffic for destination IP address 172.23.19.233 through a gateway at IP address 172.23.15.253.

```
ras> ip route set 172.23.19.233 172.23.15.253 5 Bob
```

24.2.7 ip route show Command

Syntax:

```
ras> ip route show
```

This command displays the MSC1000G’s routing table. An example is shown next.

```
ras> ip route show
dest               interface  gateway         metric name
------------------ ---------- --------------- ------ ----------------
172.23.15.0/24     outband    172.23.15.86         1 -
172.23.19.233      outband    172.23.15.253        5 Bob
192.168.1.0/24     inband     192.168.1.2          1 -
default            outband    172.23.15.254        1 -
```

24.2.8 ip show Command

Syntax:

```
ras> ip show
```

Use the command to display the current management IP settings. An example is shown next.

```
ras> ip show
interface   interface ip     netmask       vid
--------- --------------- --------------- ----
inband    192.168.1.2     255.255.255.0      1
outband   172.23.15.86    255.255.255.0      -
gateway: 172.23.15.254
```

24.2.9 ip set Command

Syntax:

```
ras> ip set inband|outband <ip>[/<netmask>] [<inband-vid>]
```

where

`inband`	=	Sets the in-band management IP address.
`outband`	=	Sets the out-of-band management IP address (for the **MGMT** port).
`[<inband-vid>]`	=	Sets the VLAN ID (Identifier) of the management (CPU) VLAN. You must connect to the MSC1000G through a port that is a member of the management (CPU) VLAN in order to perform in-band management.

This command sets the system's IP addresses and in-band management VLAN (CPU). You can only manage the MSC1000G through ports that are members of the management VLAN.

By default, you can access the management VLAN from all of the IES-5000's in-band ports since they are all in the management VLAN. If you need more security, please see the following example.

24.2.9.1 Configuring Management VLAN Example

After the following example configuration, you must connect through the third Ethernet port (uplink port 1) in order to perform inband management. You must connect through a VLAN aware device that is using the proper VLAN ID in order to perform management.

Another option would be to set the PVID of the third Ethernet port to 3, but this is not recommended since all Ethernet frames received on the port without a VLAN tag would be considered part of VLAN 3.

By default, the DSL ports are members of the management VLAN (VID 1). The following procedure shows you how to configure a tagged VLAN that limits management access to just one Ethernet port.

Use the out-of-band management port or console port to configure the MSC1000G if you misconfigure the management VLAN and lock yourself out from performing in-band management.

1 Use the `vlan set` command to configure a VLAN ID (VID 3 in this example) for managing the MSC1000G (the "management" or "CPU" VLAN).

```
ras> vlan set 3 up1 fix tag
ras> vlan enable 3
```

2 Use the `ip set` command to set VID 3 as the management VLAN.

```
ras> ip set inband 192.168.1.2 3
```

24.2.10 ip tracert Command

Syntax:

`ras> ip tracert <ip>`

This command sends a traceroute packet to the IP address (in the field to the left) and uses the response to determine the path a packet takes to that IP address.

The following example displays route information to an Ethernet device with an IP address of 172.23.19.11.

```
ras> ip tracert 172.23.19.11
Resolving 172.23.19.11... traceroute to 172.23.19.11 (172.23.19.11), 30 hops
max
, 40 byte packet
  1:172.23.14.254  (0 ms) (0 ms) (0 ms)
  2:172.23.19.11  (0 ms) (0 ms) (0 ms)
traceroute done:
```

25

lcman Commands

This chapter shows you how to use the `lcman` commands to manage the line cards.

25.1 lcman Commands Summary

The following table lists the `lcman` commands. The **P** column on the right indicates the administrator privilege level needed to use the command (**H** for high, **M** for middle or **L** for low).

Table 167 lcman Commands

COMMAND				DESCRIPTION	P
`lcman`					
	`disable`	`<slot>`		Turns off the specified line card.	H
	`enable`	`<slot>`		Turns on the specified line card.	H
	`reset`	`<slot>`		Performs a hardware reset on the specified line card.	H
	`show`	`[<slot>]`		Displays information about the installed cards.	L

25.2 lcman Commands

Use the lcman (line card manager) commands to manage the line cards.

25.2.1 lcman enable Command

Syntax:

```
ras> lcman enable <slot>
```

This command turns on the management of the specified line card. This also restarts the line card.

The following example turns on the line card in slot 7.

```
ras> lcman enable 7
```

25.2.2 lcman disable Command

Syntax:

```
ras> lcman disable <slot>
```

This command turns off the management of the specified line card. This command is for troubleshooting.

The MSC1000G can automatically restart a line card that it is managing. If a line card is unresponsive and the `lcman reset` command does not help, you may need to use `lcman disable` before connecting to the line card's console port and recovering the firmware. Do this to keep the MSC1000G from turning the line card off during your firmware recovery.

The following example turns off the line card in slot 7.

```
ras> lcman disable 7
```

25.2.3 lcman reset Command

Syntax:

```
ras> lcman reset <slot>
```

This command performs a hardware reset on the specified line card. You can use this on an unresponsive line card.

The following example resets the line card in slot 7.

```
ras> lcman reset 7
```

25.2.4 lcman show Command

Syntax:

```
ras> lcman show [<slot>]
```

This command displays information about the line cards in the system. This information includes how many slots are under management, and the type of line card the MSC1000G is managing in each slot (if any), as well as the line card's uptime, firmware version and any alarms.

The following example shows an overview of all of the cards that are installed in the system's slots.

```
ras> lcman show
id state    card type          uptime f/w version         heat vol mon down out
-- -------- ---------- ------------- ------------------- ---------------------
 1 standby  MSC1000G         01:36:48 V3.70(LU.0)           -   -   -    -   -
 2 active   MSC1000G         23:45:55 V3.70(LU.0)           -   -   -    -   -
 3 -                                                        -   -   -    -   -
 4 -        ALC1248G-53               V3.70(ABE.0)          -   -   -    V   V
 5 active   ALC1248G-53      22:45:41 V3.53(ABE.0)          -   -   -    -   -
 6 -                                                        -   -   -    -   -
 7 -        ALC1248G-51               V3.70(ABD.0)          -   -   -    V   V
 8 -                                                        -   -   -    -   -
 9 -        ALC1248G-53               V3.53(ABE.0)          -   -   -    V   V
10 -        ALC1248G-53               V3.53(ABE.0)          -   -   -    V   V
```

The following table describes labels in the example.

Table 168 lcman show Command

LABEL	DESCRIPTION
ID	This is the slot number.
state	This displays whether or not the installed card is turned on.
card type	This identifies the model of card that is installed or was last installed in the slot.
uptime	This is how long the card has been active.
f/w version	This is the release of firmware that the card is using.
	The following columns display a "V" if an alarm has been detected. "-" displays if no related alarm has been detected.
heat	This displays whether or not there is an alarm due to the card's temperature being too high or too low.
vol	This displays whether or not there is an alarm due to the card's voltage being too high or too low.
mon	This displays whether or not the hardware monitor sensor has failed.
down	This displays whether or not the installed card is down (inactive).
out	This displays whether the card is installed or has been removed.

The following example shows information about the line card installed in slot 1.

```
ras> lcman show 1

slot1 SLC1248G-22:

 uptime: 01:33:24

 status:
   hardware sensor: ok
   temperature    : ok
   voltage        : ok
   module exist   : ok
   module status  : ok

 inventory information:
   hardware version: AA
   hardware serial number: Z51854282
   firmware version: V3.70(ABF.0)b5 | 11/07/2006
   DSL driver version: 0.9.1.0
   DSL modem version: 1.1-1.5.0__004

 current voltage level:   current temperature:
     1.8V:  1.777            Temp1: 37.000
     3.3V:  3.320            Temp2: 41.000
    15.0V: 14.961            Temp3: 38.000
 '*' indicates a current alarm
```

The following table describes labels in the example.

Table 169 lcman show Command: Detailed Information

LABEL	DESCRIPTION
slot	This is the slot number followed by the model of card that is installed or was last installed in the slot.
uptime	This is how long the card has been active.
f/w version	This is the release of firmware that the card is using.
status	The following columns display a “V” if an alarm has been detected. “-” displays if no related alarm has been detected.
hardware sensor	This displays the condition of the card’s hardware monitor sensor.
temperature	This displays whether or not the card’s measured temperature is within the configured operating thresholds.
voltage	This displays whether or not the card’s measured current is within the configured operating thresholds.
module exist	This displays whether or not the card is installed.
module status	This displays whether or not the installed card is up (active).
hardware version	This is the version of the card’s physical hardware.
hardware serial number	This is the card’s individual identification number assigned at the factory.
firmware version	This is the release of firmware that the card is using.
DSL driver version	This is the driver version that a DSL line card’s DSL chip is using.
DSL modem version	This is the release of modem code that a DSL line card is using.

Table 169 lcman show Command: Detailed Information (continued)

LABEL	DESCRIPTION
current voltage level	These are the voltages (in volts) measured at the card's sensors. An "*" indicates the voltage is outside of the configured thresholds.
current temperature	These are the temperatures (in degrees Celsius) measured at the card's sensors. An "*" indicates the temperature is outside of the configured thresholds.

26

multicast Commands

This chapter shows you how to use the `multicast` commands.

26.1 multicast Commands Summary

The following table lists the `multicast` commands. The **P** column on the right indicates the administrator privilege level needed to use the command (**H** for high, **M** for middle or **L** for low).

Table 170 multicast Commands

COMMAND				DESCRIPTION	P
`multicast`					
	`bandwidth`	`default`	`<bandwidth>`	Sets the default bandwidth (between 1 and 100 000 kbps) allowed for multicast channel(s) for which you have not set the bandwidth settings.	M
		`delete`	`<index>`	Removes the specified multicast bandwidth configuration.	M
		`port`	`disable <slot-port>`	Deactivates multicast bandwidth setting on a port.	M
			`enable <slot-port>`	Activates multicast bandwidth setting on a port.	M
			`set <slot-port> <bandwidth>`	Sets the maximum multicast bandwidth allowed on a port.	M
			`show <slot>|<slot-port>`	Displays multicast bandwidth settings on the specified line card or port.	L
		`set`	`<index> <start-mcast-ip> <end-mcast-ip> <bandwidth>`	Sets bandwidth allowed for the specified multicast channel(s).	M
		`show`		Displays multicast bandwidth settings on the device.	L
	`igmp`	`disable`		Turns off IGMP proxy or snooping.	M
		`enable`	`proxy|snooping [v2|v3]`	Turns on IGMP proxy or snooping using the specified version.	M
		`qryvid`	`delete`	Removes an IGMP query VLAN ID.	M
			`set <vid>`	Adds an IGMP query VLAN ID.	M
			`show`	Displays the IGMP query VLAN IDs.	L

Table 170 multicast Commands (continued)

COMMAND				DESCRIPTION	P
		show		Displays the IGMP mode (proxy, snooping or disabled) and version (v2 or v3).	M
	igmpcount	disable	<slot-port>	Turns off the IGMP count limit for a DSL port(s).	M
		enable	<slot-port>	Turns on the IGMP count limit for a DSL port(s).	M
		set	<slot-port> <count>	Sets the IGMP count limit for a DSL port(s).	M
		show	<slot>	Displays the IGMP count limit setting status for the specified slot.	L
	igmpfilter	set	<slot-port> <igmpfilter>	Sets a DSL port(s) to use an IGMP filter profile.	M
		show	<slot>	Displays multicast group configuration and dynamic group member status.	L
	mvlan	delete	<vid>	Removes a multicast VLAN.	M
		disable	<vid>	Deactivates a multicast VLAN.	M
		enable	<vid>	Activates a multicast VLAN.	M
		group	delete <vid> <index>	Removes a multicast VLAN group.	M
			set <vid> <index> <start-mcast-ip> <end-mcast-ip>	Sets a multicast VLAN group.	M
		name	<name>	Sets the name of the multicast VLAN setting.	M
		set	<vid> <slot-port> fix|forbid	Sets the port multicast group membership settings.	M
		show	<vid>	Displays multicast VLAN settings.	L
	smcast	delete	<vid> <group-ip>	Removes a static multicast group entry.	M
		set	<vid> <group-ip> all|sub1|sub2|up1|up2|<slot-port> fix|forbid|normal	Configures a static multicast group entry.	M
		show		Displays the static multicast group configuration.	L

26.2 multicast bandwidth Commands

Use these commands to configure bandwidth requirements for multicast channels.

26.2.1 multicast bandwidth default Command

Syntax:

```
multicast bandwidth default <bandwidth>
```

where

`<bandwidth>`	=	Allowed bandwidth between 1 and 1000 000 kbps (kilo bits per second).

This command sets the default bandwidth for multicast channels for which you have not configured bandwidth requirements yet. Multicast bandwidth settings on channels (using the `multicast bandwidth set` command) have higher priority over this default setting.

The following example sets the default multicast bandwidth to 1000 kbps.

```
ras> multicast bandwidth default 1000
```

26.2.2 multicast bandwidth delete Command

Syntax:

```
multicast bandwidth delete <index>
```

This command removes the specified multicast bandwidth configuration profile.

26.2.3 multicast bandwidth set Command

Syntax:

```
multicast bandwidth set <index> <start-mcast-ip> <end-mcast-ip> <bandwidth>
```

where

`<index>`	=	A unique number for this setting.
`<start-mcast-ip>`	=	The start of the multicast address range.
`<end-mcast-ip>`	=	The end of the multicast address range. For one multicast address, enter the start multicast address again.
`<bandwidth>`	=	Allowed bandwidth between 1 and 1000 000 kbps (kilo bits per second).

This command configures bandwidth allocation for the multicast channel(s). For multicast channel(s) for which you have not configured bandwidth settings, the default multicast bandwidth setting applies (refer to Section 26.2.1 on page 409).

The following example sets the bandwidth allowed for the specified multicast channels to 1000 Kbps.

```
ras> multi  band set 1 230.230.1.1 230.230.1.10 1000
```

26.3 multicast bandwidth port Commands

Use these commands to configure multicast bandwidth limitation on specified ports.

26.3.1 multicast bandwidth port disable Command

Syntax:

```
multicast bandwidth port disable <slot-port>
```

This command deactivates multicast bandwidth settings of the specified port.

26.3.2 multicast bandwidth port enable Command

Syntax:

```
multicast bandwidth port enable <slot-port>
```

This command activates multicast bandwidth setting on the specified port.

26.3.3 multicast bandwidth port set Command

Syntax:

```
multicast bandwidth port set <slot-port> <bandwidth>
```

This command sets the bandwidth allowed for multicast traffic on the specified port(s).

This following example sets the multicast bandwidth limit to 1000 kbps on port 1 on the line card in slot 3.

```
ras> multicast bandwidth port set 3-1 1000
```

26.3.4 multicast bandwidth port show Command

Syntax:

```
multicast bandwidth port show <slot-port>
```

This command displays the multicast bandwidth setting on the specified port. The following example shows the multicast bandwidth setting for port 1 on the line card in slot 3.

```
ras> multicast bandwidth port show 3-1
card name: ALC1248G-53
 port  enable   bandwidth
------ ------ -----------
 3- 1     -    1000
ras>
```

26.4 multicast igmp Commands

Use these commands to enable or disable IGMP proxy or IGMP snooping.

26.4.1 multicast igmp disable Command

Syntax:

```
multicast igmp disable
```

This command deactivates IGMP on the system. All IGMP packets will be ignored.

26.4.2 multicast igmp enable Command

Syntax:

```
multicast igmp enable proxy|snooping [v2|v3]
```

This command turns on IGMP proxy or snooping using the specified version.

Use proxy to have the device use IGMP proxy. Use IGMP snooping to have the switch passively learn multicast groups.

If you use IGMPv2, the system discards IGMPv3 packets. This provides better security if none of the devices in the network use IGMPv3. If you select IGMPv3, the system recognizes both IGMPv2 and IGMPv3.

The following example sets the device to use IGMP proxy with IGMPv2.

```
ras> multicast igmp enable proxy v2
```

26.4.3 multicast igmp qryvid delete Command

Syntax:

```
multicast igmp qryvid delete <vid>
```

This command removes an IGMP query VLAN ID. The following example removes IGMP query VLAN ID 6.

```
ras> multicast igmp qryvid delete 6
```

26.4.4 multicast igmp qryvid set Command

Syntax:

```
ras> multicast igmp qryvid set <vid>
```

This command adds an IGMP query VLAN ID. When using IGMP proxy, the device sends IGMP queries to the members of the query VLANs. You must have already used the `vlan` commands to create the VLAN before you use this command.

The following example sets VLAN ID 6 as an IGMP query VLAN.

```
ras> multicast igmp qryvid set 6
```

26.4.5 multicast igmp qryvid show Command

Syntax:

```
ras> multicast qryvid show
```

This command displays the IGMP query VLAN IDs.

```
ras> multicast igmp qryvid show
igmp proxy query vlan table
vid  static/dynamic
---- --------------
   6 static
```

26.4.6 multicast igmp show Command

Syntax:

```
ras> multicast igmp show
```

This command displays the IGMP mode and version. The following shows an example.

```
ras> multicast igmp show
Igmp is disabled
igmp version is v2
```

26.5 IGMP Count Limit

With the IGMP count feature, you can limit the number of IGMP groups a subscriber on a port can join. This allows you to control the distribution of multicast services (such as content information distribution) based on service plans and types of subscription.

IGMP count is useful for ensuring the service quality of high bandwidth services like video or Internet Protocol television (IPTV). IGMP count can limit how many channels (IGMP groups) the subscriber connected to a DSL port can use at a time. If each channel requires 4~5 Mbps of download bandwidth, and the subscriber's connection supports 11 Mbps, you can use IGMP count to limit the subscriber to using just 2 channels at a time. This also effectively limits the subscriber to using only two IPTVs with the DSL connection.

26.6 multicast igmpcount Commands

Use these commands to configure the IGMP count limit settings.

26.6.1 multicast igmpcount disable Command

Syntax:

```
multicast igmpcount disable <slot-port>
```

This command turns off the IGMP count limit for the specified DSL port(s).

The following command turns off the IGMP count limit for DSL port 4 on the line card in slot 3.

```
ras> multicast igmpcount disable 3-4
```

26.6.2 multicast igmpcount enable Command

Syntax:

```
multicast igmpcount enable <slot-port>
```

This command turns on the IGMP count limit for the specified DSL port(s).

The following command turns on the IGMP count limit for DSL port 4 on the line card in slot 3.

```
ras> multicast igmpcount enable 3-4
```

26.6.3 multicast igmpcount set Command

Syntax:

```
multicast igmpcount set <slot-port> <count>
```

This command sets the IGMP count limit for the specified DSL port(s).

The following command sets a IGMP count limit of 2 for DSL port 4 on the line card in slot 3.

```
ras> multicast igmpcount set 3-4 2
```

26.6.4 multicast igmpcount show Command

Syntax:

```
multicast igmpcount show <slot>
```

This command displays the IGMP count limit setting status for the DSL ports on the line card in the specified slot. The following example displays the IGMP count limit settings for the ports on the line card in slot 3.

```
ras> multicast igmpcount show 3
[slot9] igmpcount
 port enable count
----- ------ -----
 3- 1   -        5
 3- 2   -        5
 3- 3   -        5
 3- 4   -        5
 3- 5   -        5
 3- 6   -        5
-------------------------- [ snip ] --------------------------
 3-44   -        5
 3-45   -        5
 3-46   -        5
 3-47   -        5
 3-48   -        5
```

26.7 multicast igmpfilter Commands

Use the IGMP filter commands to define IGMP filter profiles and assign them to DSL ports.

IGMP filter profiles allow you to control access to IGMP multicast groups. You can have a service available to a specific IGMP multicast group. You can configure an IGMP filter profile for an IGMP multicast group that has access to a service (like a SIP server for example). Then you can assign the IGMP filter profile to DSL ports that are allowed to use the service.

26.7.1 multicast igmpfilter set Command

Syntax:

```
switch igmpfilter set <slot-port> <igmpfilter>
```

where

`<igmpfilter>` = The name of an IGMP filter profile.

This command sets an ADSL port(s) to use an IGMP filter profile.

The following example sets ADSL port 9 in slot 7 to use the `voice` IGMP filter profile.

```
ras> multicast igmpfilter set 7-9 voice
```

26.7.2 multicast igmpfilter show Command

Syntax:

```
multicast igmpfilter show <slot>
```

This command displays which IGMP filter profile DSL ports are using.

The following example displays which IGMP filter profiles the DSL ports in slot 3 are using.

```
ras> multicast igmpfilter show 3
<<slot3 igmpfilter configuration>>
port igmpfilter
---- ------------------------------
   1 DEFVAL
   2 DEFVAL
   3 DEFVAL
   4 DEFVAL
   5 DEFVAL
   6 DEFVAL
   7 DEFVAL
   8 DEFVAL
   9 DEFVAL
------------------------- [ snip ] -------------------------
  44 DEFVAL
  45 DEFVAL
  46 DEFVAL
  47 DEFVAL
  48 DEFVAL
```

26.8 multicast mvlan Commands

Use these commands to configure VLAN multicast settings and set multicast port members.

Multicast VLAN allows one single multicast VLAN to be shared among different subscriber VLANs on the network. This improves bandwidth utilization by reducing multicast traffic in the subscriber VLANs and simplifies multicast group management.

26.8.1 multicast mvlan delete Command

Syntax:

```
multicast mvlan delete <vid>
```

This command removes the specified multicast VLAN configuration.

26.8.2 multicast mvlan disable Command

Syntax:

```
multicast mvlan disable <vid>
```

This command deactivates the specified multicast VLAN. The following example disables multicast VLAN 12.

```
ras> multicast mvlan disable 12
```

26.8.3 multicast mvlan enable Command

Syntax:

```
multicast mvlan enable <vid>
```

This command activates the specified multicast VLAN.

26.8.4 multicast mvlan group delete Command

Syntax:

```
multicast mvlan group delete  <vid> <index>
```

This command removes the specified multicast VLAN group setting.

26.8.5 multicast mvlan group set Command

Syntax:

```
multicast mvlan group set <vid> <index> <start-mcast-ip> <end-mcast-ip>
```

where

`<index>`	=	Multicast group number (1 -16).
`<start-mcast-ip>`	=	Start of the multicast IP address range.
`<end-mcast-ip>`	=	End of the multicast IP address range.

This command creates a multicast VLAN group. The following example creates a multicast VLAN with VID 10 and group index 1. The multicast address range is 224.224.224.1 ~ 224.224.224.10.

```
ras> multicast mvlan group set 10 1 224.224.224.1 224.224.224.10
```

26.8.6 multicast mvlan group delete Command

Syntax:

```
multicast mvlan group delete <vid> <index>
```

This command removes the specified multicast VLAN group configuration.

26.8.7 multicast mvlan name Command

Syntax:

```
multicast mvlan name <vid> <name>
```

This command sets the name of the multicast VLAN. The following example sets the name of the multicast VLAN (VID =10) to "`example`".

```
ras> multicast mvlan name 10 example
```

26.8.8 multicast mvlan set Command

Syntax:

```
multicast mvlan set <vid> <slot-port> fix|forbid
```

where

`fix|forbid` = `fix` sets the port to be a permanent member of this multicast VLAN.

`forbid` blocks the port from joining this multicast VLAN. The port will not accept multicast traffic from this multicast VLAN.

This command sets a multicast VLAN and the allowed/blocked port member(s).

The following example creates a multicast VLAN (VID =10) and sets port 1 on the line card in slot 3 to be a member of this multicast VLAN.

```
ras> multicast mvlan set 10 3-1 fix
```

26.8.9 multicast mvlan show Command

Syntax:

`multicast mvlan show [vid]`

This command displays the current multicast VLAN settings. In the state column, "-" indicates the multicast VLAN is not active while "V" indicates the multicast VLAN is active.

```
ras> multicast mvlan show
idx vid  state name
--- ---- ----- ------------------------------
  1   10   V   example
  2   12   -
ras>
```

26.9 multicast smcast Commands

Use the following multicast commands to manage static multicast groups.

26.9.1 multicast smcast delete Command

Syntax:

`multicast smcast delete <vid> <group-ip>`

where

`<group-ip>` = A multicast IP address.

This command removes a static multicast group entry.

The following example removes a static multicast group for VLAN 23 with static multicast address 239.255.255.255.

```
ras> multicast smcast delete 23 239.255.255.255
```

26.9.2 multicast smcast set Command

Syntax:

```
multicast smcast set <vid> <group-ip> all|sub1|sub2|up1|up2|<slot-port>
fix|forbid|normal
```

where

`<group-ip>`	=	A multicast IP address.
`all|sub1|sub2|up1|up2|<slot-port>`	=	The port or ports to which this static multicast group is to apply.
`fix|forbid|normal`	=	This controls the static multicast group membership status of the port (or ports). `fix` sets the port to be a permanent member of the multicast group. `normal` allows the port to join the multicast group when the device adds it through IGMP protocol. `forbidden` prohibits the port from joining the multicast group.

This command configures a static multicast group entry.

The following example creates a static multicast group for VLAN 23. The static multicast address is 239.255.255.255 and DSL port 9 in slot 7 is a permanent member.

```
ras> multicast smcast set 23 239.255.255.255 7-9 fix
```

26.9.3 multicast smcast show Command

Syntax:

```
multicast smcast show
```

This command displays the system's static multicast group configuration.

An example is shown next.

```
ras> multicast smcast show
vid  group           slot         port(F:fix, X:forbid, -:normal)
---- --------------- ---- ------------------------------------------------
   1 224.0.0.0                     1         2         3         4
                          123456789012345678901234567890123456789012345678
                        1 XXXX
                        2 XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
                        3 XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
                        4 XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
                        5 ------------------------------------------------

    Press any key to continue, 'e' to exit
ras>
```

27

port Commands

This chapter shows you how to use the `port` commands.

27.1 port Commands Summary

The following table lists the `port` commands. The **P** column on the right indicates the administrator privilege level needed to use the command (**H** for high, **M** for middle or **L** for low).

Table 171 port Commands

COMMAND				DESCRIPTION	P
`port`					
	`adsl`			ADSL port specific commands	
		`alarmprof`	`<slot-port> <alarmprofile>`	Applies an ADSL alarm profile to the subscriber port.	M
		`annexl`	`disable <slot-port>`	Turns off the Annex L reach extended feature.	M
			`enable <slot-port> [narrow]`	Turns on the Annex L reach extended feature. If the 'narrow' is not entered then Annex L mode will be enabled as 'wide' PSD mode.	M
		`annexm`	`disable <slot-port>`	Turns off the Annex M double upstream feature.	M
			`enable <slot-port>`	Turns on the Annex M double upstream feature (upstream tones from 6 to 63).	M
		`annexi`	`disable <slot-port>`	Turns off the Annex I all digital mode feature.	M
			`enable <slot-port>`	Turns on the Annex I all digital mode feature.	M
		`dscarrier0`	`<slot-port> <m1> <m2> <m3> <m4> <m5> <m6> <m7>`	Disables downstream carrier tones from 33 to 255. `<m1>~<m7>` = carrier tones, 0~ffffffff, '1' disables the corresponding tone.	M
		`dscarrier1`	`<slot-port> <m1> <m2> <m3> <m4> <m5> <m6> <m7>`	Disables downstream carrier tones from 256 to 511. `<m1>~<m7>` = carrier tones, 0~ffffffff, '1' disables the corresponding tone.	M
		`inpmin`	`<slot-port> <us_inp> <ds_inp>`	Sets the upstream (us) and downstream (ds) Impulse Noise Protection minimum setting (0~6).	M

Table 171 port Commands (continued)

COMMAND				DESCRIPTION	P
		optionmask	<slot-port> <option_mask>	Sets the following attributes. 0x0001= disable Trellis 0x0002 = disable Reed-Solomon 0x0004 = disable upstream bitswap 0x0008 = disable downstream bitswap 0x0010 = disable 1-bit constellation 0x0020 = disable transmit windowing (ADSL2+ only) 0x0040 = disable s=0.5 support (G.dmt only) 0x0080 = disable G.lite rate limit (G.lite only)	M
		pmm	disable <slot-port>	Turns off power management mode.	M
			enable <slot-port> [L2|L3]	Turns on power management mode. L2 = power management mode L2 L3 = power management mode L2 and L3	M
			param <slot-port> [l0time <l0time>] [l2time <l2time>] [l2pcb <l2atpr> <l2atprt>] [l2rate <l2minrate> <l2maxrate> <l2threshold>]	Sets the L0 (full power) and L2 (low power) power mode transition settings. <l0time> = Time (10 ~ 65535 seconds) to stay in L0 mode. <l2time> = Time (10 ~ 65535 seconds) to wait before performing another power trims in L2 mode. <l2atpr> = Maximum aggregated power reduction (APTR) per trim in dB (0 ~ l2atprt). <l2atprt> = Maximum total aggregate power reduction in dB (0-15). <l2minrate> = Minimum rate in L2 (32 ~ 4096). <l2maxrate> = Maximum rate in L2 (minimum L2 rate ~ maximum upstream rate in kbps). <l2threshold> = Line rate threshold to stay in L2 mode. When the rate is not within the threshold, the port switches to L0 mode immediately.	M
		power	<slot-port> fix|power|rate <max_us_tx> <max_ds_tx> <max_rx>	Specifies the maximum allowed transmit power and maximum aggregate received power. fix|power|rate = PSD and power adaptivity fix = fixed mode power = priority to power rate = priority to rate <max_us_tx> = maximum upstream transmit power, -130~200 in 0.1 dBm. <max_ds_tx> = maximum downstream transmit power, -50~200 in 0.1 dBm. <max_rx> = maximum aggregate receive power at atu-c, -255~255 in 0.1 dBm.	M

Table 171 port Commands (continued)

COMMAND				DESCRIPTION	P
		psd	maximum [<slot-port> <us-psd> <ds-psd>]	Sets/displays maximum upstream/ downstream nominal PSD values. This is for testing purposes. <us-psd> = Upstream PSD (-400 ~ 40 in 0.1dBm/Hz). <ds-psd> = Downstream PSD (-400 ~ 40 in 0.1dBm/Hz).	M
		set	<slot-port> <profile> <mode>	Sets ADSL port(s) to use a profile created by the `profile adsl set` command. <mode> = for Annex A, gdmt, t1413, glite, auto, adsl2, adsl2+; for Annex B, gdmt, etsi, auto, adsl2, adsl2+	M
		uscarrier	<slot-port> <m0> <m1>	Disables upstream carrier tones from 0 to 63. <m0>, <m1> = carrier tones, 0~ffffffff, '1' disables the corresponding tone.	M
	copy	<source> <destination>		Copies port settings from a source port to destination ports on the same type of line card.	M
	disable	<slot-port>		Turns off a subscriber port.	M
	enable	<slot-port>		Turns on a subscriber port.	M
	ipbpvc	arpproxy	flush all |edgerouter [<ip> <vid>] |interface [<ip/mask> <vid>]	Manually flush the learned MAC addresses from the ARP table.	M
			age set <sec>	Sets the valid time interval for learned MAC addresses in the ARP table. 10..10000 seconds	M
			show	Displays the number of seconds a learned MAC address remains valid in the ARP table.	M
		delete	<slot-port-vpi/ vci>	Remove the specified IP aware Bridge PVC.	M
		domain	delete <domain-name>	Removes the specified domain. First delete all VLANs belonging to this domain.	M
			dhcpvlan disable <domain name>	Disable DHCP VLAN in a domain	M
			dhcpvlan enable <domain name> <vid>	Enable DHCP VLAN in a domain	M
			set <domain name>	Create domain, maximum **8** domains in the system.	M
			show[<domain name>]	Display domain setting	L
			vlan <domain name> <vid> <registration>	Set vlan to join or leave specified domain, maximum **8** VLANs in one domain.	M
		edgerouter	delete <ip> <vid>	Delete specified edge router setting	M

Table 171 port Commands (continued)

COMMAND				DESCRIPTION	P
			set <ip>/<mask> <vid>	Sets the edge router	M
			show [<vid>]	Displays the edge router setting.	L
		interface	delete <ip>/<mask> <vid>	Delete an IP interface.	M
			set <ip>/<mask> <vid> [<slot-port-vpi/vci>]	Sets the interface.	M
			show all|<ip/mask>|<vid>|<ip/mask> <vid>	Displays the interface setting by optional <ip>/<mask> and vlan id parameter	L
		route	delete <domain-name> <ip/mask> <nexthop>	Deletes route entry from specified domain	M
			set <domain-name> <ip/mask> <nexthop> <metric> [<priority>]	Sets a new route to specified edgerouter for a given domain. Maximum **16** routes in a domain.	M
			show [<domain name> | <ip/mask> | <domain> <ip/mask>]	Displays current routing table for specific domain.	L
		set	<slot-port-vpi/vci> <profile> <vid> <priority> <type>	Sets IP aware Bridge PVC.	M
		show	<slot>|<slot-port>|<slot-port-vpi/vci>	Displays IP aware Bridge PVC settings.	L
		vlan	<slot-port-vpi/vci> <vid> <registration> <tag>	Sets VLAN attributes of a PVC.	M
	name	<slot-port> <name>		Sets a name for a subscriber port.	M
	paepvc			Commands for configuring and displaying PPPoA-to-PPPoE (PAE) PVC settings.	
		delete	<slot-port-vpi/vci>	Removes a PAE PVC.	M

Table 171 port Commands (continued)

COMMAND				DESCRIPTION	P
		set	<slot-port-vpi/vci> <profile> <mux> <pvid> <priority> [acname <acname>] [srvcname <srvcname>] [hellotime <hellotime>]	Configures a PVC for PAE translation. <mux> = Encapsulation type (llc or vcmux). <acname> = Host name of the access concentrator. <srvcname> = Descriptive name for the service that uses this PVC. <hellotime> = Timeout (0-600 seconds) for PPPoE session. Note: Make sure the VID is not already used for MVLAN or TLS PVC.	M
		show	<slot>|<slot-port>|<slot-port-vpi/vci>	Displays the PAE PVC settings for the specified port and/or slot.	L
	ppvc			Priority PVC channel commands.	
		delete	<slot-port-vpi/vci>	Removes a priority-based PVC.	M
		member	delete <slot-port-vpi/vci> <vpi/vci>	Removes a PVC channel from a PVC group.	M
			set <slot-port-vpi/vci> <vpi/vci> <atmprofile> <level>	Adds a priority-PVC into the group.	M
		set	<slot-port-vpi/vci> <mux> <pvid> <priority>	Creates a priority-based PVC. <mux> = encapsulation: llc, vcmux <pvid> = default VLAN ID, 1~4094 <priority> = default priority, 0~7	M
		show	<slot>|<slot-port>|<slot-port-vpi/vci> [detail]	Displays runtime configured virtual channels.	L
		vlan	<slot-port-vpi/vci> <vid> <registration> <tag>	Adds a PVC channel to a VLAN. <registration> = join or leave <tag> = TX tagging, tag or untag	M
	pvc			Permanent Virtual Circuit channel specific commands.	
		delete	<slot-port-vpi/vci>	Removes a PVC setting.	M
		mvlan	disable <slot-port-vpi/vci>	Deactivates multicast VLAN on the PVC.	M
			enable <slot-port-vpi/vci>	Activates the multicast VLAN in the PVC.	M

Table 171 port Commands (continued)

COMMAND				DESCRIPTION	P
		set	<slot-port-vpi/vci> <profile> <mux> <pvid> <priority>	Creates or modifies a PVC setting. <profile> = ATM profile <mux> = encapsulation: llc, vcmux <pvid> = default VLAN ID, 1~4094 <priority> = default priority, 0~7	M
		show	<slot>|<slot-port>|<slot-port-vpi/vci> [detail]	Displays runtime configured virtual channels.	L
		usratelimit	enable <pvc>	Activates upstream rate limiting on the PVC.	M
			disable <pvc>	Deactivates upstream rate limiting on the PVC.	M
			set <pvc> <rate>	Sets the maximum upstream rate (in Kbps) the PVC is allowed to use.	M
			show <pvc>	Displays upstream rate limiting settings.	L
		vlan	<slot-port-vpi/vci> <vid> <registration> <tag>	Adds a PVC channel to a VLAN. <registration> = join or leave <tag> = TX tagging, tag or untag	M
	shdsl			SHDSL specific commands.	
		alarmprof	<slot-port> span|stuc|stur|* <alarmprofile>	Sets SHDSL ports or end point(s) to use an alarm profile. span = set alarm profile for the whole span stuc = set alarm profile at stuc end point stur = set alarm profile at stur end point * = set alarm profile at both stuc and stur	M
		pbo	<slot-port> normal_epl|forced_epl|forced_no_epl <value>	Sets power backoff for SHDSL port(s). normal_epl = Power backoff with EPL (Estimated Power Loss). forced_epl = Forced power backoff with EPL. forced_no_epl = Forced power backoff without EPL. <value> = 0~31 in dB	M
		pmms	<slot-port> <mode>	Sets the negotiated noise margin mode of the SHDSL port(s). <mode> = negotiated noise margin mode, normal|forced	M
		set	<slot-port> <profile_name>	Sets SHDSL port(s) to use a profile created by the profile shdsl set command.	M
	show	<slot>|<slot-port>		Displays port settings.	L
	tel	<slot-port> <telephone-no>		Records a DSL port(s) subscriber's telephone number.	M
	tlspvc			Commands to configure Transparent LAN Service (TLS) or VLAN stacking on the PVCs.	

Table 171 port Commands (continued)

COMMAND				DESCRIPTION	P
		delete	<slot-port-vpi/vci>	Removes a TLS PVC.	M
		set	<slot-port-vpi/vci> <profile> llc|vcmux <vid> <priority>	Sets/changes TLS PVC settings.	M
		show	<slot>|<slot-port>|<slot-port-vpi/vci>	Displays the settings for a TLS PVC.	L
	vdsl	alarmprof	<slot-port> <profile>	Sets the VDSL port(s) to use the specified alarm profile.	M
		frametype	<slot-port> <all|tag>	Sets the acceptable frame type on the VDSL port(s).	M
		frequencyplan	<slot-port> <997|998>	Sets the band plan the VDSL port(s) uses.	M
		priority	<slot-port> <priority>	Sets the VDSL port(s) VLAN priority (0 - 7).	M
		pvid	<slot-port> <vid>	Sets the port VID on the VDSL port(s).	M
		rfiband	<slot-port> <disable|ansi|etsi|custom>	Selects an RFI band or disables this feature.	M
		rficustom		Uses these commands to set custom RFI settings. The settings are applied to all VDSL ports.	
			disable <index>	Displays the settings of a custom RFI entry.	M
			enable <index>	Activates the specified custom RFI entry.	M
			set <index> <start_freq> <stop_freq>	Sets a custom RFI entry. index = 1 - 8 start_freq = start of the frequency range in kHz. start_freq cannot be bigger than stop_freq. stop_freq= end of the frequency range in kHz.	M
			show	Displays custom RFI settings.	L
		set	<slot-port> <profile> <vdsl_profile>	Specifies the profiles on the VDSL port(s). profile = custom line profile. vdsl_profile = 8a|8b|8c|8d|12a|	M
		tls	disable <slot-port>	Disables Transparent LAN Service (TLS). The system does not insert additional VLAN tags to packets.	M
			enable <slot-port>	Disables Transparent LAN Service (TLS) to insert additional VLAN tags to packets.	M
			set <slot-port> <svid> <spriority>	Sets/changes TLS settings on the VDSL port(s).	M

Table 171 port Commands (continued)

COMMAND				DESCRIPTION	P
		upbo	<slot-port> <on|off>	Enables/disable Upstream Power Back Off (UPBO).	M
		vlan	<slot-port> <vid> <registration> <tag>	Sets the VLAN setting on the VDSL port(s).	M

27.2 port Commands

Use the `port` commands to configure the DSL ports.

27.3 port adsl Commands

Use the `port adsl` commands to configure the subscriber ADSL ports.

27.3.1 port adsl alarmprof Command

Syntax:

```
port adsl alarmprof <slot-port> <alarmprofile>
```

where

`<alarmprofile>` = The name of an ADSL alarm profile.

This command applies (maps) an ADSL alarm profile to the subscriber port(s).

The following example sets ADSL port 5 on the line card in slot 7 to use the SESalarm alarm profile.

```
ras> port adsl alarmprofile 7-5 SESalarm
```

27.3.2 port adsl annexl disable Command

Syntax:

```
port adsl annexl disable <slot-port>
```

This command turns off the Annex L reach extended feature on the specified ADSL2 port(s).

The following example turns off the Annex L feature for port 5 on the line card in slot 75.

```
ras> port adsl annexl disable 5-7
```

27.3.3 port adsl annexl enable Command

Syntax:

```
port adsl annexl enable <slot-port> [narrow]
```

where

[narrow]	=	The “narrow” PSD (Power Spectral Density) mode. The narrow mode supports longer loop lengths but has lower transmission speeds. The “wide” PSD mode is used if you do not enter “narrow”. The wide mode supports higher transmission speeds but requires shorter loop lengths.

This command turns on the Annex L reach extended feature on the specified ADSL2 port(s). Annex L can be used with Annex A (ADSL over POTS), not Annex B (ADSL over ISDN).

The following example turns on the Annex L feature for port 7 on the line card in slot 5.

```
ras> port adsl annexl enable 5-7
```

27.3.4 port adsl annexm disable Command

Syntax:

```
port adsl annexm disable <slot-port>
```

This command turns off the Annex M double upstream feature on the specified ADSL2/2+ port(s).

The following example turns off the Annex M feature for port 5 on the line card in slot 7.

```
ras> port adsl annexm disable 7-5
```

27.3.5 port adsl annexm enable Command

Syntax:

```
port adsl annexm enable <slot-port>
```

This command turns on the Annex M double upstream feature on the specified ADSL2/2+ port(s). This has the upstream connection use tones 6 to 63.

The following example turns on the Annex M feature for port 5 on the line card in slot 7.

```
ras> port adsl annexm enable 7-5
```

27.3.6 port adsl annexi disable Command

Syntax:

```
port adsl annexi disable <slot-port>
```

This command turns off the Annex I all digital mode feature on the specified ADSL2/2+ port(s).

The following example turns off the Annex I feature for port 5 on the line card in slot 7.

```
ras> port adsl annexi disable 7-5
```

27.3.7 port adsl annexi enable Command

Syntax:

```
port adsl annexi enable <slot-port>
```

This command turns on the Annex I all digital mode feature on the specified ADSL2/2+ port(s). With Annex I, the ADSL connection uses the full spectrum of the physical line and the user can not use POTS or ISDN service.

The following example turns on the Annex I feature for port 5 on the line card in slot 7.

```
ras> port adsl annexi enable 7-5
```

27.3.8 port adsl dscarrier0 Command

Syntax:

```
port adsl dscarrier0 <slot-port> <m1> <m2> <m3> <m4> <m5> <m6> <m7>
```

where

`<m1> ~ <m7>` = The downstream carrier tones to be disabled. Each <mx> can use up to 8 hexadecimal digits (0~ffffffff). Each <mx> represents 32 carrier tones (each hexadecimal digit represents 4 tones).

`<m1>` = tones 32~63
`<m2>` = tones 64~95
`<m3>` = tones 96~127
`<m4>` = tones 128~159
`<m5>` = tones 160~191
`<m6>` = tones 192~223
`<m7>` = tones 224~255

The hexadecimal digit is converted to binary and a '1' disables the corresponding tone. Disabling a carrier tone turns it off so the system does not send data on it.

This command disables downstream carrier tones from 33 to 255 on the specified ADSL port(s). Use this command to have the system not use an ADSL line's tones that are known to have a high noise level.

The following example disables downstream carrier tone 89 for ADSL port 5 on the line card in slot 7.

```
ras> port adsl dscarrier0 7-5 0 01000000 0 0 0 0 0
```

This example disables downstream carrier tones 89 and 90 for ADSL port 5 on the line card in slot 7.

```
ras> port adsl dscarrier0 7-5 0 03000000 0 0 0 0 0
```

27.3.9 port adsl dscarrier1 Command

Syntax:

```
port adsl dscarrier1 <slot-port> <m0> <m1> <m2> <m3> <m4> <m5> <m6> <m7>
```

where

<m0> ~ <m7>	=	The downstream carrier tones to be disabled. Each <mx> can use up to 8 hexadecimal digits (0~ffffffff). Each <mx> represents 32 carrier tones (each hexadecimal digit represents 4 tones). <m0> = tones 256~287 <m1> = tones 288~319 <m2> = tones 320~351 <m3> = tones 352~383 <m4> = tones 384~415 <m5> = tones 416~447 <m6> = tones 448~479 <m7> = tones 480~511 The hexadecimal digit is converted to binary and a '1' disables the corresponding tone. Disabling a carrier tone turns it off so the system does not send data on it.

This command disables downstream carrier tones from 256 to 511 on the specified ADSL2+ port(s). Use this command to have the system not use an ADSL line's tones that are known to have a high noise level.

The following example disables downstream carrier tone 301 for ADSL2+ port 5 on the line card in slot 7.

```
ras> port adsl dscarrier1 7-5 0 00001000 0 0 0 0 0 0
```

The following example disables downstream carrier tones 301 to 304 for ADSL2+ port 5 on the line card in slot 7.

```
ras> port adsl dscarrier1 7-5 0 0000f000 0 0 0 0 0 0
```

27.3.10 port adsl inpmin Command

Syntax:

```
port adsl inpmin <slot-port> <us_inp> <ds_inp>
```

where

<us_inp>	=	Sets the minimum upstream (us) impulse noise protection setting. Use 0~6 to define a number of DMT symbols. 0 = 0, 1 = 0.5, 2 = 1, 3 = 2, 4 = 4, 5 = 8, 6 = 16 DMT symbols
<ds_inp>	=	Sets the minimum downstream (ds) impulse noise protection setting (0~6).

This command sets the minimum upstream (us) and downstream (ds) impulse noise protection setting on the specified ADSL port(s). Sudden spikes in the line's noise level (impulse noise) can cause errors and result in lost packets. Set the impulse noise protection minimum to have a buffer to protect the ADSL physical layer connection against impulse noise. This buffering causes a delay that reduces transfer speeds. It is recommended that you use a non-zero setting for real time traffic that has no error correction (like videoconferencing).

The following example sets the impulse noise protection minimum to 2 DMT symbols for upstream and 4 DMT symbols for downstream for ADSL port 5 on the line card in slot 7.

```
ras> port adsl inpmin 7-5 3 4
```

27.3.11 port adsl optionmask Command

Syntax:

```
port adsl optionmask <slot-port> <option_mask>
```

where

<option_mask> = 0x0001= disable Trellis
Trellis encoding helps to reduce the noise in ADSL transmissions. Trellis may reduce throughput but it makes the connection more stable.

0x0002 = disable Reed-Solomon
Reed-Solomon performs transmission error correction.

0x0004 = disable upstream bitswap
0x0008 = disable downstream bit swap

Bit swapping allows the system to respond to noise on a tone by sending it's data on another tone. The subscriber (ATU-R) equipment must also support this in order for it to work.

0x0010 = disable 1-bit constellation
1-bit constellation allows the system to send individual bits over DMT tones that can only support one bit. This allows the connection to use as many of the tones as possible.

0x0020 = disable transmit windowing (ADSL2+ only)

0x0040 = disable s=0.5 support option in G.dmt.
0.5 support maps two Reed-Solomon codewords into one data frame (instead of one) to increase the maximum G.dmt transmission rate.

0x0080 = disable G.lite rate limit (G.lite only).
Disabling the G.lite rate limit allows the G.lite upstream transmission rate to be greater than 512 Kbps.

This command masks (turns off) attributes for the specified port(s). It is for advanced troubleshooting. Use an entry with a "1" instead of "0" before the "x" in order to turn the attribute back on (remove the option mask).

The following example sets ADSL port 5 on the line card in slot 7 to not use Trellis encoding.

```
ras> port adsl optionmask 7-5 0x0001
```

27.3.12 port adsl pmm disable Command

Syntax:

```
port adsl pmm disable <slot-port>
```

This command turns off the Power ManageMent (PMM) feature on the specified ADSL2/2+ port(s).

The following example sets ADSL2+ port 5 on the line card in slot 7 to not use power management.

```
ras> port adsl pmm disable 7-5
```

27.3.13 port adsl pmm enable Command

Syntax:

```
port adsl pmm enable <slot-port> [L2|L3]
```

where

L2	=	Power management mode L2. This is a power saving mode that scales back the power usage to where there is just enough to support the transmission rate that the subscriber is using.
L3	=	Power management mode L2 and L3. Power management mode L3 is a power saving mode that puts the ADSL connection to sleep when there is no traffic. The connection comes back up within three seconds when there is traffic.

This command turns on the Power ManageMent (PMM) feature on the specified ADSL2/2+ port(s). This reduces the amount of power used overall and reduces the instances of the connection going down. PMM increases or decreases the transmission power based on line conditions.

The following example sets ADSL2+ port 5 on the line card in slot 7 to use power management.

```
ras> port adsl pmm enable 7-5
```

27.3.14 port adsl power Command

Syntax:

```
port adsl power <slot-port> fix|power|rate <max_us_txpwr> <max_ds_txpwr>
<max_rxpwr>
```

where

fix|power|rate	=	The PSD (Power Spectral Density) and power adaptivity mode. fix = fixed mode sets the maximum downstream transmit power to the number you specify (<max_ds_txpwr>). power = power mode gives the saving of transmission power priority over the transmission rate. The line card attempts to reduce its transmit power as much as possible while still maintaining the configured minimum rate. This only applies to the downstream connection and the ADSL operational mode must be G.dmt, ANSI T1.413 or G.lite. rate = rate mode gives the transmission rate priority over the saving of transmission power. The line card attempts to achieve the maximum configured transmission rate before reducing the transmit power.
<max_us_txpwr>	=	Maximum upstream transmit power, -130~200 in 0.1 dBm.

<max_ds_txpwr>	=	Maximum downstream transmit power, -50~200 in 0.1 dBm.
<max_rxpwr>	=	Maximum aggregate receive power at atu-c, -255~255 in 0.1 dBm.This only applies to the ADSL2/2+ ADSL operational modes.

This command specifies the maximum allowed transmit power and maximum aggregate received power.

The following example sets ADSL port 5 on the line card in slot 7 to only use up to 10.0 dBm of power for upstream transmissions, 11.5 dBm of power for downstream transmissions and -7.0 dBm of aggregated receive power.

```
ras> port adsl power 7-5 fix 100 115 -70
```

27.3.15 port adsl psd maximum Command

Syntax:

```
port adsl psd maximum <slot-port> <us-psd> <ds-psd>
```

where

<us-psd>	=	Maximum upstream PSD (Power Spectrum Density) mask (between -400 to 40 in units of 0.1 dBm/Hz).
<ds-psd>	=	Maximum upstream PSD mask (between -400 to 40 in units of 0.1 dBm/Hz).

This command sets the PSD masks for the upstream and downstream channels. PSD defines the distribution of a DSL line's power in the frequency domain. A PSD mask is a template that specifies the maximum allowable PSD for a line.

The following example sets the maximum upstream and downstream PSD masks of port 1 on the line card in slot 2 to -200 (-20 dBm/Hz) and 10 (1 dBm/Hz) respectively.

```
ras> port adsl psd maximum 2-1 -200 10
```

27.3.16 port adsl set Command

Syntax:

```
port adsl set <slot-port> <profile> <mode>
```

where

<profile>	=	The ADSL profile that will define the settings of this port.
<mode>	=	The ADSL operational mode. for Annex A: gdmt, t1413, glite, auto, adsl2 or adsl2+ for Annex B: gdmt, etsi, auto, adsl2 or adsl2+ When set to auto, the port follows whatever mode is set on the other end of the line.

This command assigns a specific profile to an ADSL port(s) and sets the port's ADSL mode (or standard). The profile defines the maximum and minimum upstream/downstream rates, the target upstream/downstream signal noise margins, and the maximum and minimum upstream/downstream acceptable noise margins of all the ADSL ports to which you assign the profile.

When the mode is set to auto, the connection rates are governed by the negotiated ADSL mode regardless of the rates configured in the profile. For example, if the profile is set to use a rate of 18000 Kbps, that speed is only supported if the negotiated ADSL mode is ADSL 2+. Any other ADSL mode will limit the rate to what is supported by the specific ADSL standard.

The following example sets ADSL port 5 on the line card in slot 7 to use the gold profile and adsl2+ mode.

```
ras> port adsl set 7-5 gold adsl2+
```

27.3.17 port adsl uscarrier Command

Syntax:

```
port adsl uscarrier <slot-port> <m0> <m1>
```

where

<m0>,<m1>	=	The upstream subcarriers to be disabled. Each <mx> can use up to 8 hexadecimal digits (0~ffffffff). Each <mx> represents 32 carrier tones (each hexadecimal digit represents 4 tones). <m0> = tones 0~31 <m1> = tones 32~63 The hexadecimal digit is converted to binary and a '1' disables the corresponding tone. Disabling a carrier tone turns it off so the system does not send data on it.

This command disables upstream carrier tones from 0 to 63 on the specified ADSL port(s). Use this command to have the system not use an ADSL line's tones that are known to have a high noise level.

The following example disables upstream carrier tone 8 for ADSL port 5 on the line card in slot 7.

```
ras> port adsl uscarrier 7-5 00000080 0
```

This example disables upstream carrier tones 8 and 9 for ADSL port 5 on the line card in slot 7.

```
ras> port adsl uscarrier 7-5 00000180 0
```

27.4 port copy Command

Syntax:

```
port copy <source> <destination>
```

where

`<source>`	=	The slot and port number from which you want to copy settings.
`<destination>`	=	The slot and port number(s) to which you want to copy settings.

This command copies the port settings from a source port to destination ports on the same type of line card.

The following example copies the settings from DSL port 5 on the line card in slot 7 to all of the DSL ports on the line card in slot 7.

```
ras> port copy 7-5 7-*
```

27.5 port disable Command

Syntax:

```
port disable <slot-port>
```

This command turns off the specified subscriber port(s).

The following example turns off DSL port 5 on the line card in slot 7.

```
ras> port disable 7-5
```

27.6 port enable Command

Syntax:

```
port enable <slot-port>
```

This command turns on the specified subscriber port(s).

The following example turns on DSL port 5 on the line card in slot 7.

```
ras> port enable 7-5
```

27.7 IP Bridge Commands

These sections explain how to set up the IP bridge function in the MSC1000G.

The IP bridge function is designed for large-scale, flat, access networks, and it is ideal when the network is based on Ethernet. When the IP bridge is enabled, the MSC1000G forwards frames based on the destination IP address, instead of the destination MAC address, and it replaces the source MAC address with its own MAC address.

You can follow these steps to set up a simple IP bridge.

1. Create a domain. (Each domain is an ISP.)
2. Create one or more VLANs in the domain. (For example, one VLAN is for high-speed Internet, and another VLAN is for VoIP.)
3. Specify one or more edge routers for the domain.
4. Create routing table entries, so the MSC1000G forwards frames to the appropriate edge router.
5. Create downlink interfaces, so the MSC1000G forwards frames to the appropriate subscribers.
6. Create PVCs for the subscribers.

27.8 IP Bridge ARP Proxy Commands

Use these commands to look at and flush the Address Resolution Protocol (ARP) table for each domain. You can also configure how long the MSC1000G keeps entries in the ARP table.

The MSC1000G is an ARP proxy for edge routers and subscribers in an IP bridge. You can configure basic settings for this, and you can look at (and flush, in some cases) the (PVC, MAC, IP, VID) information the MSC1000G has learned using DHCP snooping and ARP.

27.8.1 port ipbpvc arpproxy age Command

Syntax:

```
port ipbpvc arpproxy age <sec>
```

where

`<sec>`	=	The number of seconds (10~10000) the device is to keep the Address Resolution Protocol table's entries of IP addresses in IP bridges.

This command configures how long the device stores the IP addresses of CPE devices in IP bridges in the Address Resolution Protocol table.

27.8.2 port ipbpvc arpproxy flush Command

Syntax:

```
port ipbpvc arpproxy flush <all | edgerouter [<ip> <vid>] | interface [<ip/
mask> <vid>]>
```

where

`all`	=	All ARP table entries.
`<ip>`	=	IP address, in dotted decimal notation.
`<mask>`	=	Number of bits <1..32> in the subnet mask.
`<vid>`	=	The ID (<1..4094>) of the VLAN.

This command clears the specified entries in the Address Resolution Protocol table(s).

27.8.3 port ipbpvc arpproxy show Command

Syntax:

```
port ipbpvc arpproxy show
```

This command displays how long the device stores the IP addresses of IP bridge devices in the Address Resolution Protocol table.

The following is an example.

```
ras> port ipbpvc arpproxy show
age=300 (sec)
```

27.9 IP Bridge PVC Commands

Use the `port ipbpvc delete, set` (see Section 27.14.4 on page 446) and `show` (see Section 27.14.5 on page 447) commands to set up and maintain PVCs for subscribers in an IP bridge.

IP bridge PVCs are similar to regular PVCs and are endpoints of the IP bridge. In addition, IP bridge PVCs are one of two types, IP over Ethernet or IP over ATM, depending on the underlying network.

The PVID is used to identify the domain the PVC is in, so the PVID must be in a domain.

27.10 port ipbpvc delete Command

Syntax:

```
port ipbpvc delete <slot-port-vpi/vci>
```

where

```
vpi/vci          =
```
The VPI and VCI of an individual PVC.

This command deletes the specified PVC channel in an IP bridge.

The following example deletes the IP bridge PVC on ADSL port 10 with VPI 40, VCI 73.

```
ras> port ipbpvc show 1-10
pvc              type   pvid pri ipbpvctype profile
---------------- ------- ---- --- ---------- --------------------------------
--
1-10-40/73      ipb     402  2   llc        DEFVAL
ras> port ipbpvc delete 1-10-40/73
ras> port ipbpvc show 1-10
ras>
```

27.11 IP Bridge Domain Commands

Use these commands to set up and maintain domains in IP bridges.

A domain represents an ISP. Each domain is defined by (and dominates) the VLAN that are in it and has its own routing table and ARP table. As a result, two or more VLANs in different domains can use the same IP subnet, and one network can support multiple ISPs.

VLANs in IP bridges are exclusive. They can be in at most one domain. In addition, VLANs in IP bridges share the same VLAN space as regular VLANs, so VLANs in IP bridges must have different VLAN IDs than regular VLANs.

27.11.1 port ipbpvc domain delete Command

Syntax:

```
port ipbpvc domain delete <domain name>
```

where

```
<domain name>    =
```
The name of the domain.

This command deletes the specified domain.

You have to remove the VLANs that are in the domain first.

27.11.2 port ipbpvc domain dhcpvlan enable Command

Syntax:

```
port ipbpvc domain dhcpvlan enable <domain name> <vid>
```

where

```
<domain name>    =
```
The name of the domain.

```
<vid>            =
```
The ID (<1..4094>) of the VLAN.

This setting has no effect on DHCP packets that come from VLANs where the MSC1000G's DHCP relay settings are active. (See Chapter 18 on page 347. The DHCP relay settings take precedence over the IP bridge DHCP VLAN setting.)

This command specifies the VLAN where the domain's DHCP server is located. The VLAN must already be in the domain. The MSC1000G forwards subscribers' DHCP packets to the selected VLAN and changes the source MAC address to the MSC1000G's MAC address.

The MSC1000G still adds whatever Option 82 information is specified for the VLAN in the DHCP relay settings. (See Chapter 18 on page 347.)

In the following example, domain "example3" has its DHCP server in VLAN 401.

```
ras> port ipbpvc domain dhcpvlan enable example3 401
```

27.11.3 port ipbpvc domain dhcpvlan disable Command

Syntax:

```
port ipbpvc domain dhcpvlan disable <domain name>
```

where

```
<domain name>    =
```
The name of the domain.

This setting has no effect on DHCP packets that come from VLANs where the MSC1000G's DHCP relay settings are active. (See Chapter 18 on page 347. The DHCP relay settings take precedence over the IP bridge DHCP VLAN setting.)

This command specifies that there is no DHCP server for the domain, in which case the MSC1000G does not change the source MAC address in DHCP packets.

The MSC1000G still adds whatever Option 82 information is specified for the VLAN in the DHCP relay settings. (See Chapter 18 on page 347.)

27.11.4 port ipbpvc domain set Command

Syntax:

```
port ipbpvc domain set <domain name>
```

where

```
<domain name>    =
```
You can use 1-31 printable English keyboard characters. Spaces are not allowed.

This command creates the domain with the specified name.

An example is shown next.

```
port ipbpvc domain set example
```

27.11.5 port ipbpvc domain show Command

Syntax:

```
port ipbpvc domain show [<domain name>]
```

where

`<domain name>`	=	The name of the domain.

This command displays the settings for the specified domain and the VLAN that are in the domain.

An example is shown next.

```
ras> port ipbpvc domain show
domain                          vid
------------------------------- ----------------------------------------
ISP1                            *101 102
example
```

The output values correspond to the input values of other IP bridge domain commands.

27.11.6 port ipbpvc domain vlan Command

Syntax:

```
port ipbpvc domain vlan <domain name> <vid> join|leave
```

where

`<domain name>`	=	The name of the domain.
`<vid>`	=	The ID (<1..4094>) of the VLAN.
`join|leave`	=	Specifies whether you want to add the specified VLAN to (`join`) or remove the specified VLAN from (`leave`) the domain.

This command adds the specified VLAN to (`join`) or removes the specified VLAN (`leave`) from the specified domain. VLANs in IP bridges share the same VLAN space as regular VLANs, so VLANs in IP bridges must have different VLAN IDs than regular VLANs. Use the `port ipbpvc VLAN` command to configure the VLAN (see Section 27.18.10 on page 457).

You have to delete every IP bridge setting (including DHCP VLAN) that uses the selected VLAN before you can remove it from the domain.

In the following example, VLAN 402 is added to domain “example”.

```
ras> port ipbpvc domain vlan example 402 join
```

27.12 IP Bridge Edge Router Commands

Use these commands to set up and maintain edge routers in an IP bridge.

Edge routers are usually the gateways that are provided to the subscribers. They can also be gateways that are specified in static routing table entries. Each edge router, in addition to its IP address, has an associated VLAN ID. When the MSC1000G forwards a frame to an edge router, it uses this VLAN ID to replace whatever VLAN ID the subscriber specified.

27.12.1 port ipbpvc edgerouter delete Command

Syntax:

```
port ipbpvc edgerouter delete <ip> <vid>
```

where

`<ip>`	=	IP address, in dotted decimal notation.
`<vid>`	=	The ID (<1..4094>) of the VLAN.

This command deletes the edge router with the specified IP address and VLAN ID.

The following example deletes edge router 192.168.1.244 with VID 402.

```
ras> port ipbpvc edgerouter delete 192.168.1.244 402
```

27.12.2 port ipbpvc edgerouter set Command

Syntax:

```
port ipbpvc edgerouter set <ip/mask> <vid>
```

where

`<ip/mask>`	=	Edge router’s IP address, in dotted decimal notation and number of bits <1..32> in the subnet mask.
`<vid>`	=	The ID (<1..4094>) of the VLAN.

This command creates an edge router with the specified IP address, subnet mask, and VID. The MSC1000G uses the VLAN ID when it forwards frames to the edge router. It also uses the VLAN ID to identify the domain the edge router is in.

The following example creates edge router 192.168.1.244 with subnet mask 255.255.255.0 and VID 402.

```
ras> port ipbpvc edgerouter set 192.168.1.244/24 402
```

27.12.3 port ipbpvc edgerouter show Command

Syntax:

```
port ipbpvc edgerouter show <all | domain-name [<vid>]>
```

where

`<domain name>`	=	The name of the domain.
`<vid>`	=	The ID (<1..4094>) of the VLAN.

This command displays the edge routers for the specified VLAN or for all VLAN.

An example is shown next.

```
ras> port ipbpvc edgerouter show all
domain                          ip/mask            vid
------------------------------- ------------------ --------
ISP1                            172.23.19.249/24   102
ISP1                            172.23.19.254/24   101
example                         192.168.1.200/24   402
```

The output values correspond to the input values of other IP bridge edge router commands.

27.13 IP Bridge Interface Commands

Use these commands to set up and maintain forwarding information for downstream traffic.

Downlink interfaces provide forwarding information for downstream traffic. The MSC1000G learns some of this information by snooping DHCP packets. For static IP addresses, you should provide this information manually. In this case, specify the VLAN ID and, optionally, the PVC for a range of IP addresses. The MSC1000G uses the VLAN ID to identify the domain the downlink interface is in. Downlink interfaces in the same domain cannot have overlapping IP addresses.

27.13.1 port ipbpvc interface delete Command

Syntax:

```
port ipbpvc interface delete <ip/mask> <vid>
```

where

`<ip/mask>`	=	Downlink interface's IP address, in dotted decimal notation and number of bits <1..32> in the subnet mask.
`<vid>`	=	The ID (<1..4094>) of the VLAN.

This command deletes the specified downlink interface. You can only remove downlink interfaces that were added manually.

The following example removes the downlink interface for 192.168.1.200/24 in VLAN 402.

```
ras> port ipbpvc interface show 402
ip/mask            vid  slot port vpi vci
------------------ ---- ---- ---- --- ----
192.168.1.200/24     402  -    -    -   -
ras> port interface delete 192.168.1.200/24 402
ras> port ipbpvc interface show 402
ras>
```

27.13.2 port ipbpvc interface set Command

Syntax:

```
port ipbpvc interface set <ip/mask> <vid> [<slot-port-vpi/vci>]
```

where

`<ip/mask>`	=	Downlink interface's IP address, in dotted decimal notation and number of bits <1..32> in the subnet mask.
`<vid>`	=	The ID (<1..4094>) of the VLAN.
`vpi/vci`	=	The VPI and VCI of an individual PVC.

This command creates the specified downlink interface. The `<ip>/<mask>` specifies the IP address and subnet mask of the VLAN or subscriber. If the destination IP address of a packet is in this range, the MSC1000G forwards the frame to the specified VLAN and PVC, if any.

The MSC1000G uses the specified VLAN ID when it forwards frames to the VLAN or subscriber. It also uses the VLAN ID to identify the domain the downlink interface is in.

Make sure you specify a valid IP bridge PVC. Do not specify PVCs that are not set as the IPB PVCs (see Section 27.14.4 on page 446).

The following example creates a downlink interface that forwards frames for IP addresses 192.168.3.0~192.168.3.255 to VLAN 402.

```
ras> port ipbpvc interface set 192.168.3.0/24 402
```

27.13.3 port ipbpvc interface show Command

Syntax:

```
port ipbpvc interface show <all | ip/mask | vid | ip/mask vid>
```

where

`ip/mask`	=	Downlink interface's IP address, in dotted decimal notation and number of bits <0..32> in the subnet mask.
`vid`	=	The ID (<1..4094>) of the VLAN.

This command displays downlink interfaces created manually. It does not show forwarding information learned by snooping DHCP packets.

An example is shown next.

```
ras> port ipbpvc interface show 402
ip/mask            vid  slot port vpi vci
------------------ ---- ---- ---- --- ----
192.168.3.0/24     402  -    -    -   -
```

The output values correspond to the input values of other IP bridge downlink interface commands.

27.14 IP Bridge Routing Table Commands

Use these commands to set up and maintain the routing table for each domain.

Each domain has its own routing table. Each routing table contains entries that, based on the destination IP address, control where the MSC1000G forwards packets (for upstream and downstream traffic). The MSC1000G automatically creates routing table entries for each downlink interface and for each edge router in the domain. You can create additional entries by specifying the edge router to which the MSC1000G should forward traffic for a particular destination IP address or IP subnet.

27.14.1 port ipbpvc route delete Command

Syntax:

```
port ipbpvc route delete <domain-name> <ip/mask> <nexthop>
```

where

`<domain-name>`	=	The name of the domain.
`<ip/mask>`	=	IP address, in dotted decimal notation and number of bits <0..32> in the subnet mask.
`<nexthop>`	=	IP address, in dotted decimal notation.

This command deletes the specified entry from the routing table of the specified domain. You can only remove entries that were added manually.

The following example removes the entry for 172.32.37.0~172.32.37.255 for domain "example2".

```
ras> adsl ipbpvc route show example2
domain name          ip/netmask          gateway ip      metric pri
-------------------- ------------------- --------------- ------ ---
example2             0.0.0.0/0           192.168.1.252        1   0
example2             172.23.37.0/24      192.168.1.250        1   0
example2             192.168.2.0/24      192.168.1.249        1   0
ras> adsl ipbpvc route delete example2 172.23.37.0/24 192.168.1.250
ras> adsl ipbpvc route show example2
domain name          ip/netmask          gateway ip      metric pri
-------------------- ------------------- --------------- ------ ---
example2             0.0.0.0/0           192.168.1.252        1   0
example2             192.168.2.0/24      192.168.1.249        1   0
```

27.14.2 port ipbpvc route set Command

Syntax:

`port ipbpvc route set <domain-name> <ip/mask> <nexthop> <metric> [<priority>]`

where

`<domain-name>`	=	The name of the domain.
`<ip/mask>`	=	IP address, in dotted decimal notation and number of bits <0..32> in the subnet mask.
`<nexthop>`	=	IP address, in dotted decimal notation.
`<metric>`	=	The metric <1..15> represents the "cost" of transmission for routing purposes. IP routing uses hop count as the measurement of cost, with a minimum of 1 for directly-connected networks. Select the number that approximates the cost for this link The number need not be precise, but it must be between 1 and 15. In practice, 2 or 3 is usually a good number. If two entries have the same metric, the MSC1000G uses the one with the lower IP address.
`<priority>`	=	The IEEE 802.1p priority value <0..7>.

This command creates the specified entry in the routing table of the specified domain.

The `<ip>/<mask>` specifies the range of IP addresses to which this entry applies. If the destination IP address of a packet is in this range, the MSC1000G forwards the frame to the specified IP address `<nexthop>`. If `<nexthop>` corresponds to an edge router configured using the edge router commands (see Section 27.12 on page 441), the MSC1000G uses the associated VLAN ID. In addition,

- If the edge router is in the same domain as the entry, the entry is used for upstream traffic.
- If the edge router is in a different domain than the entry, the entry is used for downstream traffic.

If `<nexthop>` is not set up in the edge router screen, the MSC1000G uses the entry for downstream traffic and does not change the VLAN ID.

If the <priority> is not specified, the default value is zero. This is applied to incoming frames without a <priority> tag.

The following example creates an entry in the routing table for domain “example3”. This entry forwards traffic for IP addresses 192.168.4.0~192.168.4.255 to edge router 192.168.1.244.

```
ras>  port ipbpvc route set example3 192.168.4.0/24 192.168.1.244 1
```

27.14.3 adsl ipbpvc route show Command

Syntax:

```
adsl ipbpvc route show [all | <domain-name> | <ip/mask> | <domain-name> <ip>/
<mask>]
```

where

<domain-name>	=	The name of the domain.
<ip/mask>	=	IP address, in dotted decimal notation and number of bits <0..32> in the subnet mask.

This command displays routing table entries created manually for the specified domain and/or range of IP addresses. It does not show entries added automatically by the MSC1000G.

An example is shown next.

```
ras> port ipbpvc route show all
domain                          ip/mask            nexthop         mtrc pr
------------------------------- ------------------ --------------- ---- --
ISP1                            0.0.0.0/0          172.23.19.254   15   0
ISP1                            192.169.1.0/24     172.23.19.249   5    0
example3                        192.168.4.0/24     192.168.1.244   1    -
```

The output values correspond to the input values of other IP bridge routing table commands.

27.14.4 port ipbpvc set Command

Syntax:

```
port ipbpvc set <slot-port-vpi/vci> <profile> <vid> <priority> <type>
```

where

<vpi/vci>	=	The VPI setting can be 0 to 255. The VCI setting can be 32 to 65535 if the vpi is 0 or 1 to 65535 if the vpi is not 0.
profile	=	Assign an ATM profile to use for this channel’s traffic shaping.

<vid>	=	The default VID (1 to 4094). Each PVC must have a unique VID since the MSC1000G forwards traffic back to the subscribers based on the VLAN ID. You must assign a default VID (1 to 4094) and IEEE 802.1p default priority (0 to 7) to normal channels. Each PVC must have a unique VID (since the MSC1000G forwards traffic back to the subscribers based on the VLAN ID).
<priority>	=	This is the priority value (0 to 7) to add to incoming frames without a (IEEE 802.1p) priority tag.
<type>	=	Specify the encapsulation type for the PVC. llc and vc are for a PVC running on Ethernet (IPoE). llc_r and vc_r are for a PVC running on ATM (IPoA).

This command allows the configuration of a PVC (permanent virtual circuit) for one or a range of ADSL ports in an IP bridge.

The following example sets a PVC on slot 1, DSL port 10 with VPI 40, VCI 73, DEFVAL profile, default VID 402 and priority 2. It uses LLC encapsulation over Ethernet.

```
ras> port ipbpvc set 1-10-40/73 DEFVAL 402 2 llc
ras> port ipbpvc show 1-10
pvc              type   pvid pri ipbpvctype profile
---------------- ------- ---- --- ---------- --------------------------------
--
1-10-40/73      ipb     402  2   llc        DEFVAL
```

27.14.5 port ipbpvc show Command

Syntax:

```
port ipbpvc show  <slot>|<slot-port>|<slot-port-vpi/vci>
```

where

vpi/vci	=	The VPI and VCI of an individual PVC.

This command allows you to display the PVCs for subscribers in an IP bridge.

An example is shown next.

```
ras> port ipbpvc show 1-10
pvc              type   pvid pri ipbpvctype profile
---------------- ------- ---- --- ---------- --------------------------------
--
1-10-40/73      ipb     402  2   llc        DEFVAL
```

The output values correspond to the input values of other IP bridge PVC commands.

27.14.6 port ipbpvc vlan Command

Syntax:

```
port ipbpvc vlan <slot-port-vpi/vci> <vid> <registration> <tag>
```

where

vpi/vci	=	The VPI and VCI of an individual PVC.
<vid>	=	The default VID (1 to 4094). Each PVC must have a unique VID since the MSC1000G forwards traffic back to the subscribers based on the VLAN ID. You must assign a default VID (1 to 4094) and IEEE 802.1p default priority (0 to 7) to normal channels. Each PVC must have a unique VID (since the MSC1000G forwards traffic back to the subscribers based on the VLAN ID).
<registration>	=	Use join to have the port be a member of the specified VLAN. Use leave to remove the port from the specified VLAN.
<tag>	=	Use tag to tag all frames transmitted on this PVC with the port's VID. Use untag to not frames transmitted on this PVC with the port's VID.

Use this command to configure a IPB PVC's VLAN settings.

The following example sets the PVC on slot 1, DSL port 10 with VPI 40, VCI 73 to be a member of VLAN 402 and not tag the frames sent to this PVC.

```
ras> port ipbpvc vlan 1-10-40/73 402 join untag
```

27.15 port name Command

Syntax:

```
port name <slot-port> <name>
```

where

<name>	=	A name to identify the subscriber port.

This command sets a name for the specified subscriber port(s).

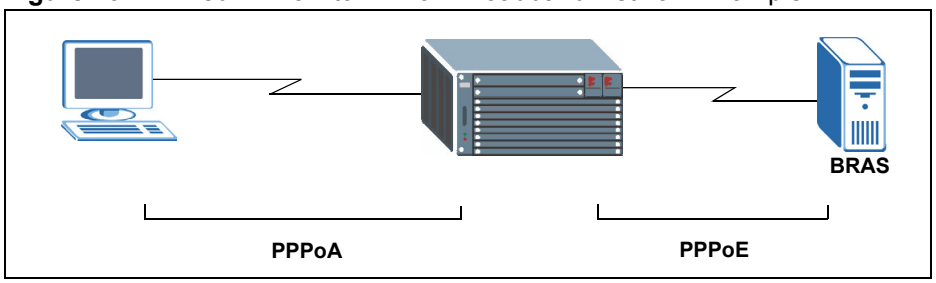
The following example sets DSL port 5 on the line card in slot 7 to use the name Bob.

```
ras> port name 7-5 bob
```

27.16 PPPoA to PPPoE (PAE) Translation

Before migrating to an Ethernet infrastructure, a broadband network might consist of PPPoA connections between the CPE devices and the DSLAM and PPPoE connections from the DSLAM to the BRAS (Broadband Remote Access Server). The following figure shows a network example.

Figure 191 Mixed PPPoA-to-PPPoE Broadband Network Example



In order to allow communication between the end points (the CPE devices and the BRAS), you need to configure the DSLAM (the MSC1000G) to translate PPPoA frames to PPPoE packets and vise versa.

When PPPoA packets are received from the CPE, the ATM headers are removed and the MSC1000G adds PPPoE and Ethernet headers before sending the packets to the BRAS. When the MSC1000G receives PPPoE packets from the BRAS, PPPoE and Ethernet headers are stripped and necessary PVC information (such as encapsulation type) is added before forwarding to the designated CPE.

You can use the `port paepvc` command to create PVCs for PAE translation.

27.16.1 port paepvc delete Command

Syntax:

```
port paepvc delete <slot-port-vpi/vci>
```

This command removes a PAE PVC.

27.16.2 port paepvc set Command

Syntax:

```
port paepvc set <slot-port-vpi/vci> <profile> <mux> <pvid> <priority> [acname
<acname>] [srvcname <srvcname>] [hellotime <hellotime>]
```

where

`<profile>`	=	Name of an ATM profile.
`<mux>`	=	Encapsulation method (llc or vcmux).

<acname>	=	This field is optional. Specify the hostname of a remote access concentrator if there are two access concentrators (or BRAS) on the network or that you want to allow PAE translation to the specified access concentrator.
<srvname>	=	This field is optional. Specify the name of the service that uses this PVC. This must be a service name that you configure on the remote access concentrator.

This command creates a PPPoA-to-PPPoE PVC to allow communication between the ATM (CPE) and Ethernet network (BRAS) segments. The PVC is mapped to a PPPoE session that connects to the specified BRAS.

The following example creates a PPPoA-to-PPPoE PVC (1/33) for port 1 on the line card in slot 3. The PVC uses llc encapsulation and the DEFVAL ATM profile with a priority of 1. This configuration is for the video service on the vom access concentrator. The switch waits until the hello time timeout before terminating the PPPoE session.

```
ras> port paepvc set 3-1-1/33 DEFVAL llc 2 1 acname vom srvcname video
hellotime 10
```

27.16.3 port paepvc show Command

Syntax:

```
port paepvc show <slot>|<slot-port>|<slot-port-vpi/vci>
```

This command displays the PPPoA-to-PPPoE PVC settings for the specified port and/or slot.

The following example displays the settings on the line card in slot 3.

```
ras> port paepvc show 3
pvc              type   mux   pvid  pri  htime profile/acname/srvcname
-------------- ------- ----- ------ ---- ----- -------------------------
3-1-1/33           pae  llc       2    1    10 DEFVAL/test/example
ras>
```

27.17 port ppvc Commands

Use the port ppvc commands to configure PPVCs and add and remove member PVCs.

27.17.1 port ppvc delete Command

Syntax:

```
port ppvc delete <slot-port-vpi/vci>
```

This command removes a PPVC. Removing a PPVC also deletes all of the member PVCs.

The following example removes a PPVC with VPI 8 and VCI 35 for port 5 on the line card in slot 7.

```
ras> port ppvc delete 7-5-8/35
```

27.17.2 port ppvc member delete Command

Syntax:

```
port ppvc member delete <slot-port-vpi/vci> <vpi/vci>
```

where

<slot-port-vpi/vci>	=	The slot and port(s) and VPI/VCI of the PPVC.
<vpi/vci>	=	The VPI and VCI of the individual PVC that you are removing from the PPVC.

This command removes a PVC from a PPVC.

The following example removes a PVC that uses VPI 8 and VCI 36 from a PPVC with VPI 8 and VCI 35 for port 5 on the line card in slot 7.

```
ras> port ppvc member delete 7-5-8/35 8/36
```

27.17.3 port ppvc member set Command

Syntax:

```
port ppvc member set <slot-port-vpi/vci> <vpi/vci> <atmprofile> <level>
```

where

<slot-port-vpi/vci>	=	The slot and port(s) and VPI/VCI of the PPVC.
<vpi/vci>	=	The VPI and VCI of the individual PVC that you are adding to the PPVC. The VPI setting can be 0 to 255. The VCI setting can be 32 to 65535 with a VPI of 0 or 1 to 65535 if the VPI is not 0.
<atmprofile>	=	The name of an ATM profile.
<level>	=	The priority queue (0~3) to use for this PVC's traffic. 3 is the highest priority.

This command adds a member PVC to a PPVC. You must create the PPVC before you use this command to add a member.

The following example adds a PVC to a PPVC with VPI 8 and VCI 35 for port 5 on the line card in slot 7. The PVC uses VPI 8 and VCI 36, the DEFVAL ATM profile and priority queue 2.

```
ras> port ppvc member set 7-5-8/35 8/36 DEFVAL 2
```

27.17.4 port ppvc set Command

Syntax:

```
port ppvc set <slot-port-vpi/vci> <mux> <pvid> <priority>
```

where

<slot-port-vpi/vci>	=	The slot, port(s) and VPI/VCI of the PPVC.
<mux>	=	The type of encapsulation: llc, vcmux
<pvid>	=	Set a default VID (1 to 4094) for the channel. The channel can only forward frames with this VLAN ID. The system would drop any frames received from the subscriber that are tagged with another VLAN ID. Each PVC must have a unique VID since the system forwards traffic back to the subscribers based on the VLAN ID.
<priority>	=	Set an IEEE 802.1p default priority (0 to 7) to add to incoming frames without a (IEEE 802.1p) priority tag.

This command creates a PPVC.

The following example creates a PPVC with VPI 8 and VCI 35 for port 5 on the line card in slot 7. The PPVC uses llc encapsulation and default VID 25. Any frames received without an IEEE 802.1p priority tag will be assigned a priority of 3.

```
ras> port ppvc set 7-5-8/35 llc 25 3
```

27.17.5 port ppvc show Command

Syntax:

```
port ppvc show <slot>|<slot-port>|<slot-port-vpi/vci> [detail]
```

where

<slot-port-vpi/vci>	=	The slot and port(s) and VPI/VCI of the PPVC.

`<vid>`	=	The VLAN ID. Valid parameter range = [1 – 4094]. This must be the VLAN ID of a VLAN that is already configured. The ports specified in this command must also be set to the fixed status in the VLAN.
`[detail]`	=	Display the PPVC's VLAN configuration in addition to the other PPVC settings.

This command displays the runtime configured PPVCs.

The following example displays the PPVCs configured on the DSL port 5 on the line card in slot 7. It also displays VLAN information.

```
ras> port ppvc show 7-5-8/35 detail
pvc             type   mux   pvid  pri  profile
--------------- ------ ----- ------ ---- --------------------------------
7-5-8/35        prio   llc      25    3

member:
vpi/vci   level profile
--------- ----- --------------------------------
8/36      2     DEFVAL

vlans:
idx  vlanid    adv     untag
--- -------- -------- --------
  1       25      fix    untag
  2       28      fix    untag
```

27.17.6 port ppvc vlan Command

Syntax:

```
port ppvc vlan <slot-port-vpi/vci> <vid> <registration> <tag>
```

where

`<slot-port-vpi/vci>`	=	The slot and port(s) and VPI/VCI of the PPVC.
`<vid>`	=	The VLAN ID. Valid parameter range = [1 – 4094]. This must be the VLAN ID of a VLAN that is already configured. The ports specified in this command must also be set to the fixed status in the VLAN.

<registration>	=	The VLAN membership setting. join = add the PVC to the VLAN. leave = remove the PVC from the VLAN.
<tag>	=	The VLAN tagging setting. tag = the specified port(s) accept only incoming Ethernet frames that have a VLAN tag. untag = the specified port(s) accept only incoming Ethernet frames that do not have a VLAN tag.

This command adds a PPVC to a VLAN or removes a PPVC from a VLAN. It also sets whether the PPVC accepts incoming Ethernet frames with or without a VLAN tag.

The following example adds the PPVC on ADSL port 5 in line card 7 with VPI 8 and VCI 35 to VLAN 28.

```
ras> port ppvc vlan 7-5-8/35 28 join untag
```

27.18 port pvc Commands

Use the following `port pvc` commands to configure PVCs (Permanent Virtual Circuits) on the DSL ports.

27.18.1 port pvc delete Command

Syntax:

```
port pvc delete <slot-port-vpi/vci>
```

This command removes the specified PVC channel.

The following example removes the PVC on DSL port 5 on the line card in slot 7 with VPI 8 and VCI 35.

```
ras> port pvc delete 7-5-8/35
```

27.18.2 port pvc mvlan disable Command

Syntax:

```
port pvc mvlan disable <slot-port-vpi/vci>
```

This command deactivates multicast VLAN on the PVC. No multicast traffic will be sent to this PVC.

27.18.3 port pvc mvlan enable Command

Syntax:

```
port pvc mvlan enable <slot-port-vpi/vci>
```

This command enables multicast VLAN on the PVC.

27.18.4 port pvc set Command

Syntax:

```
port pvc set <slot-port-vpi/vci> <profile> <mux> <pvid> <priority>
```

where

<slot-port-vpi/vci>	=	The slot and port(s) and VPI/VCI of the PVC.
<profile>	=	The name of an ATM profile.
<mux>	=	The type of encapsulation: llc, vcmux
<pvid>	=	Set a default VID (1 to 4094) for the channel. The channel can only forward frames with this VLAN ID. The system would drop any frames received from the subscriber that are tagged with another VLAN ID. Each PVC must have a unique VID since the system forwards traffic back to the subscribers based on the VLAN ID.
<priority>	=	Set an IEEE 802.1p default priority (0 to 7) to add to incoming frames without a (IEEE 802.1p) priority tag.

This command creates or modifies a PVC setting.

The following example sets a PVC on DSL port 5 on the line card in slot 7 with VPI 8, VCI 35, the DEFVAL profile, default VID 2 and priority 3.

```
ras> port pvc set 7-5-8/35 DEFVAL vcmux 2 3
```

27.18.5 port pvc show Command

Syntax:

```
port pvc show <slot>|<slot-port>|<slot-port-vpi/vci> [detail]
```

where

<slot-port-vpi/vci>	=	The slot and port(s) and VPI/VCI of the PVC.
[detail]	=	Display in depth information about the runtime configured virtual channels.

This command displays the runtime configured virtual channels for the specified DSL port(s).

The following example displays the virtual channels of DSL port 5 on the line card in slot 7.

```
ras> port pvc show 7-5
pvc             type   mux   pvid  pri  profile
--------------- ------ ----- ------ ---- --------------------------------
7-5-0/33        bridge  llc       1    0 DEFVAL
```

27.18.6 port pvc usratelimit enable Command

Syntax:

```
port pvc usratelimit enable <pvc>
```

This command activates upstream rate limiting on the PVC. The following example activates upstream rate settings on the PVC (0/33 of port 1 on the line card in slot 5).

```
ras> port pvc usratelimit enable 5-1-0/33
```

27.18.7 port pvc usratelimit disable Command

Syntax:

```
port pvc usratelimit disable <pvc>
```

This command deactivates upstream rate limiting on the PVC.

27.18.8 port pvc usratelimit set Command

Syntax:

```
port pvc usratelimit set <pvc> <rate>
```

This command sets the maximum upstream rate (in Kbps) the PVC is allowed to use. The following example sets the maximum PVC upstream rate to 1000 Kbps on port 1 of the line card in slot 5.

```
ras> port pvc usratelimit enable 5-1-0/33
ras> port pvc usratelimit set 5-1-0/33 1000
ras> port pvc usratelimit show 5-1
pvc            en   rate
-------------- ---- --------------
5-1-0/33         V    1000(kbps)
ras>
```

27.18.9 port pvc usratelimit show Command

Syntax:

```
port pvc usratelimit show <pvc>
```

This command displays upstream rate limiting settings on a PVC. The following example shows the PVC rate settings on port 1 of the line card in slot 5.

```
ras> port pvc usratelimit show 5-1
pvc            en   rate
-------------- ---- --------------
5-1-0/33         -    1000(kbps)
ras>
```

27.18.10 port pvc vlan Command

Syntax:

`port pvc vlan <slot-port-vpi/vci> <vid> <registration> <tag>`

where

`<slot-port-vpi/vci>`	=	The slot and port(s) and VPI/VCI of the PVC.
`<vid>`	=	The VLAN ID. Valid parameter range = [1 – 4094]. This must be the VLAN ID of a VLAN that is already configured. The ports specified in this command must also be set to the fixed status in the VLAN.
`<registration>`	=	The VLAN membership setting. `join` = add the PVC to the VLAN. `leave` = remove the PVC from the VLAN.
`<tag>`	=	The VLAN tagging setting. `tag` = the specified port(s) accept only incoming Ethernet frames that have a VLAN tag. `untag` = the specified port(s) accept only incoming Ethernet frames that do not have a VLAN tag.

This command adds a PVC to a VLAN or removes a PVC from a VLAN. It also sets whether the PVC sends frames with or without a VLAN tag.

The following example adds the PVC on DSL port 5 on the line card in slot 7 with VPI 8 and VCI 35 to VLAN 23.

```
ras> port pvc vlan 7-5-8/35 23 join untag
```

27.19 port shdsl Commands

Use the `port shdsl` commands to configure the subscriber SHDSL ports.

27.19.1 port shdsl alarmprof Command

Syntax:

```
port shdsl alarmprof <slot-port> span|stuc|stur|* <alarmprofile>
```

where

span|stuc|stur|*	=	span = set alarm profile for the whole span This is the entire connection including any SHDSL regenerators that might be located between the STU-C (SHDSL Termination Unit - Central) and STU-R (SHDSL Termination Unit - Remote) end points. An SHDSL regenerator amplifies the SHDSL signal in order to increase the connection distance. stuc = set alarm profile at STU-C (SHDSL Termination Unit - Central) end point stur = set alarm profile at STU-R (SHDSL Termination Unit - Remote) end point * = set alarm profile at both STU-C and STU-R
<alarmprofile>	=	The name of an SHDSL alarm profile.

This command sets the specified SHDSL port(s) or end point(s) to use an alarm profile.

The following example sets SHDSL port 8 on the line card in slot 6 to use the SESalarm alarm profile at both the STU-C and the STU-R.

```
ras> port shdsl alarmprof 6-8 * SESalarm
```

27.19.2 port shdsl pbo Command

Syntax:

```
port shdsl pbo <slot-port> normal_epl|forced_epl|forced_no_epl <value>
```

where

normal_epl|forced_epl|forced_no_epl	=	normal_epl = Power backoff with EPL (Estimated Power Loss). Each end calculates an EPL and uses it in determining a power backoff value for the other end to use. forced_epl = Forced power backoff with EPL. The STU-C calculates an EPL and uses it in determining the power backoff values for both ends. This can be used when the STU-R device does not support EPL. forced_no_epl = Forced power backoff without EPL. The STU-C uses the value you specify in determining the power backoff values for both ends. This can be used when you have prior knowledge about the physical line (loop).
<value>	=	This sets the 0~31 in dB. When using nornal_epl or forced_epl, this sets the maximum power backoff value. When using forced_no_epl, this sets the power backoff value.

This command sets the power backoff feature setting on the specified SHDSL port(s). Power backoff calculates how much power is needed for the connection. This allows the STU-C and STU-R to use only enough power for the port's maximum transmission rate (configured in the SHDSL profile). You can normally just leave the default setting (normal_epl), you only need to use this command if the STU-R does not support EPL or you need to configure the port to use a specific power backoff setting.

This example sets SHDSL port 7 on the line card in slot 6 to use 13 dB of power backoff for both downstream and upstream.

```
ras> port shdsl pbo 6-7 forced_no_epl 13
```

27.19.3 port shdsl pmms Command

Syntax:

```
port shdsl pmms <slot-port> <mode>
```

where

<mode>	=	The PMMS (Power Measurement Modulation Session) mode specifies how the target noise margin value is acquired. normal = Negotiated target noise margin mode. Each end of the connection determines the target noise margin to be used by the other end for the evaluation of the PMMS results. forced = Forced target noise margin mode. The upstream and downstream parameters are set according to the target noise margin value set in the SHDSL profile.

This command sets the PMMS (Power Measurement Modulation Session) mode of the specified SHDSL port(s).

The following example sets SHDSL port 8 on the line card in slot 6 to use the negotiated target noise margin mode.

```
ras> port shdsl pmms 6-8 normal
```

27.19.4 port shdsl set Command

Syntax:

```
port shdsl set <slot-port> <profile>
```

where

<profile>	=	The SHDSL profile that will define the settings of this port.

This command assigns a specific profile to an SHDSL port(s). The profile defines the maximum and minimum transmission rates, the regional setting, the number of wire pairs to be used, whether line-probing is enabled or disabled and the target and worst case noise margins.

The following example sets SHDSL port 8 on the line card in slot 6 to use the gold profile.

```
ras> port shdsl set 6-8 gold
```

27.20 port show Command

Syntax:

```
port show <slot>|<slot-port>
```

This command displays the settings of the specified port(s). An example is shown next.

```
ras> port show 7-5
port 7-5
  name         :
  tel. no      :
  profile      : DEFVAL
  alrm prof    : DEFVAL
  state        : enable              mode         : auto
  power mgmt   : disable             annexl       : disable
  annexm       : disable             annexi       : disable
  power adap.  : fix                 max_us_txpwr: 10.0   dBm
  max_ds_txpwr: 10.0   dBm           max_rxpower : 10.0   dBm
  us_inpmin    : 3                   ds_inpmin    : 3
  option_mask : 0x0000               uscarrier    : 00000000 00000000
  dscarrier (255~32) :
  00000000 00000000   00000000 00000000   00000000 00000000   00000000
  dscarrier (512~256) :
  00000000 00000000   00000000 00000000   00000000 00000000   00000000 00000000
```

27.21 port tel Command

Syntax:

`port show <slot-port> <telephone-no>`

where

`<telephone-no>` = The subscriber's telephone number.

This command records a subscriber's telephone number for the specified DSL port(s).

The following example records a telephone number of 123456789 for DSL port 5 on the line card in slot 7.

```
ras> port tel 7-5 123456789
```

27.22 Transparent LAN Service (TLS)

Transparent LAN Service (also known as VLAN stacking or Q-in-Q) allows a service provider to distinguish multiple customers VLANs, even those with the same (customer-assigned) VLAN ID, within its network. Refer to Section 11.8.3 on page 166 for more information.

Use the `port tlspvc` commands to configure VLAN stacking settings for the specified PVC(s).

You can NOT configure PPPoA-to-PPPoE and TLS settings on the same PVC.

27.22.1 port tlspvc delete Command

Syntax:

```
port tlspvc delete <slot-port-vpi/vci>
```

This command clears TLS settings for the PVC.

27.22.2 port tlspvc set Command

Syntax:

```
port tlspvc set <slot-port-vpi/vci> <profile> llc|vcmux <vid> <priority>
```

where

`<profile>`	=	Name of an ATM profile.
`llc|vcmux`	=	Encapsulation method (llc or vcmux).
`<vid>`	=	The VLAN ID the switch adds to the traffic on the PVC. This is the VLAN ID known in the service provider's network.

Note: Make sure this VLAN ID is not already used for MVLAN or PAE.

This command sets the second VLAN tag to add to the packets from the PVC.

The following example adds a VLAN tag (`100`) to the traffic using the `DEFVAL` ATM profile on PVC (`1/33`) on port `2` of the line card in slot `3`.

```
ras> port tlspvc set 3-2-1/33 DEFVAL llc 100 12
```

27.22.3 port tlspvc show Command

Syntax:

```
port tlspvc show <slot>|<slot-port>|<slot-port-vpi/vci>
```

This command displays the TLS settings for the specified slot/port/PVC.

```
ras> port tlspvc show 3-2
pvc              type   mux   pvid  pri  profile
-------------- ------- ----- ------ ---- --------------------
3-2-1/33           tls  llc     100    1 DEFVAL
ras>
```

27.23 port vdsl Commands

Use the `port vdsl` commands to configure the subscriber VDSL ports.

27.23.1 port vdsl alarmprof Command

Syntax:

```
port vdsl alarmprof <slot-port> <profile>
```

This command sets the VDSL port(s) to use the specified alarm profile.

27.23.2 port vdsl frametype Command

Syntax:

```
port vdsl frametype <slot-port> <all|tag>
```

where

`<all|tag>`	=	Sets the selected VDSL port(s) to accept VLAN tagged and untagged Ethernet frames or only tagged.

This command sets the acceptable frame type on the VDSL port(s).

27.23.3 port vdsl frequencyplan Command

Syntax:

```
port vdsl frequencyplan <slot-port> <997|998>
```

where

`<997|998>`	=	Selects a band plan to use. For symmetric connections, use `997`.[A] For asymmetric connections, enter `998`.

A. Band plan 997 is not supported at the time of writing.

This command sets the band plan the VDSL port(s) uses.

27.23.4 port vdsl priority Command

Syntax:

```
port vdsl priority <slot-port> <priority>
```

This command sets the VDSL port(s) VLAN priority (0 - 7).

27.23.5 port vdsl pvid Command

Syntax:

```
port vdsl pvid <slot-port> <vid>
```

This command sets the port VID on the VDSL port(s).

27.23.6 port vdsl rfiband Command

Syntax:

```
port vdsl rfiband <slot-port> <disable|ansi|etsi|custom>
```

where

`<disable|ansi|etsi|custom>`	=	Enter `ansi` or `etsi` to use the pre-defined RFI band. Enter `disable` to deactivate this feature. Enter `custom` to use the RFI band settings configured using the `port vdsl rficustom` command.

Use this command to specify an RFI mode or disable this feature.

27.23.7 port vdsl rficustom Commands

Syntax:

```
port vdsl rficustom disable <index>
port vdsl rficustom enable <index>
port vdsl rficustom set <index> <start_freq> <stop_freq>
port vdsl rficustom show
```

where

`<index>`	=	This is index number (1-8) of the custom RFI entry.
`<start_freq>`	=	This is the start of the frequency range in kHz (0~2147483647). Note: `<start_freq>` cannot be bigger than `<stop_freq>`.
`<stop_freq>`	=	This is the end of the frequency range in kHz.

Use these commands to configure or display the settings of a custom RFI entry.

An example is show below:

- Creates a custom RFI entry with the frequency between 3500 and 3800 kHz.
- Activate the settings.
- Show the settings.

```
ras> port vdsl rficustom set 1 3500  3800
ras> port vdsl rficustom enable 1
ras> port vdsl rficustom show
 index   state   start_freq   stop_freq
------- ------- ------------ -----------
      1       V         3500        3800
      2       -            0           0
      3       -            0           0
      4       -            0           0
      5       -            0           0
      6       -            0           0
      7       -            0           0
      8       -            0           0
ras>
```

27.23.8 port vdsl set Command

Syntax:

```
port vdsl set <slot-port> <profile> <vdsl_profile>
```

where

`<profile>`	=	Sets the custom line profile.
`<vdsl_profile>`	=	Sets the standard band plan profile (`8a|8b|8c|8d|12a`).

Use this command to set the VDSL line and band plan profiles the port(s) use.

The following example sets port 5 on the VDSL card in slot 4 to use the `DEFVAL` line profile and the standard `8b` band plan profile.

```
ras> port vdsl set 4-1 DEFVAL 8b
```

27.23.9 port vdsl tls Commands

Syntax:

```
port vdsl tls disable <slot-port>
port vdsl tls enable <slot-port>
port vdsl tls set <slot-port> <svid> <spriority>
```

where

`<svid>`	=	Sets the service provider ID (from 1 to 4094) to add on frames received.
`<spriority>`	=	Sets the priority level (from 0 to 7) for the service provider's VLAN ID.

Use these commands to configure Transparent LAN Service (TLS) settings on the VDSL port(s).

The following shows an example.

- Enables TLS on port 5 on the VDSL line card in slot 4.
- Configures the service provider's VID to 10 and VLAN priority to 7 (highest priority).

```
ras> port vdsl tls enable 4-5
ras> port vdsl tls set 4-5 10 7
```

27.23.10 port vdsl upbo Commands

Syntax:

```
port vdsl upbo <slot-port> <on|off>
```

This command enables or disables Upstream Power Back Off (UPBO) on the VDSL port(s). UPBO allows the switch to provide better service in a network environment with telephone wiring of varying lengths.

The following example enables UPBO on all ports on VDSL line card in slot 4.

```
ras> port vdsl upbo 4-* on
```

27.23.11 port vdsl vlan Commands

Syntax:

```
port vdsl vlan <slot-port> <vid> <registration> <tag>
```

where

`<vid>`	=	Enter a VID (VLAN ID) to add this channel as a member. This must be the VLAN ID of a VLAN that is already configured. The port that you are configuring must also be set to the fixed status in the VLAN.
`<registration>`	=	Enter `join` to have the port be a member of the specified VLAN. Enter `leave` to remove the port from the specified VLAN.
`<tag>`	=	Enter `tag` to add a tag to all frames transmitted on this port. Enter `untag` to not add tags.

This command sets the port VALN settings on the VDSL port(s).

The following example sets the VDSL port 5 on the line card in slot 4 to join VLAN 5. The port also adds a tag to frames.

```
ras> port vdsl vlan 4-5 5 join tag
```

28

profile Commands

This chapter shows you how to use the `profile` commands.

28.1 Profiles Overview

Profiles are groups of settings that you can assign to a DSL port(s). This helps simplify and speed up DSL port configuration.

28.2 profile Commands Summary

The following table lists the `profile` commands. The **P** column on the right indicates the administrator privilege level needed to use the command (**H** for high, **M** for middle or **L** for low).

Table 172 profile Commands

COMMAND				DESCRIPTION	P
`profile`					
	`adsl`			ADSL profiles allow efficient configuration of ADSL port settings.	M
		`delete`	`<profile>`	Removes an unreferenced ADSL port settings profile.	M
		`map`	`<profile>`	Displays which ADSL ports reference this profile.	L

Table 172 profile Commands (continued)

COMMAND				DESCRIPTION	P
		set	<profile> <us-max-rate> <ds-max-rate> [fast|delay <us-delay> <ds-delay>][minrate <us-min-rate> <ds-min-rate>] [usmgn <us-max-mgn> <us-min-mgn> <us-tgt-mgn>][dsmgn <ds-max-mgn> <ds-min-mgn> <ds-tgt-mgn>] [usra fixed|startup|runtime <us-us-mgn> <us-ds-mgn>][dsra fixed|startup|runtime <ds-us-mgn> <ds-ds-mgn>]	Creates a profile of ADSL port settings. “us” is UpStream, “ds” is DownStream us maximum rate = 64~4096 in Kbps ds maximum rate = 64~32000 in Kbps us/ds delay = 1~255 in ms us minimum rate = 32~4096 in Kbps ds minimum rat e= 32~32000 in Kbps max noise margin = 0~310 in 0.1 dB min. noise margin = 0~310 in 0.1 dB target noise margin = 0~310 in 0.1 dB fixed = no rate adaptation startup = rate adaptation at initialization runtime = rate adaptation any time up shift noise margin = 0~310 in 0.1 dB us/ds down shift noise margin = 0~310 in 0.1 dB	M
		show	[<profile>]	Lists the ADSL configuration profiles or a specific profile’s detailed settings.	L
	alarmadsl			ADSL alarm profiles allow efficient configuration of ADSL alarm settings.	
		delete	<profile>	Removes an unreferenced ADSL alarm profile.	M
		map	<profile>	Displays which ADSL ports reference this alarm profile.	L

Table 172 profile Commands (continued)

COMMAND				DESCRIPTION	P
		set	<profile> atuc [lofs <lofs>] [loss <loss>] [lols <lols>] [lprs <lprs>] [ess <ess>] [ffr <ffr>] [sesl <sesl>] [uasl <uasl>] [fru <fru>] [iru <iru>] [frd <frd>] [ird <ird>] [ift <ift>] or <profile> atur [lofs <lofs>] [loss <loss>] [lprs <lprs>] [ess <ess>] [sesl <sesl>] [uasl <uasl>] [fru <fru>][iru <iru>][frd <frd>] [ird <ird>]	Creates a profile of ADSL alarm settings. <profile> = profile name, up to 31 characters atuc = near end atur = far end <lofs> = number of loss of framing seconds, 0~900 <loss> = number of loss of signal seconds, 0~900 <lols> = number of loss of link seconds, 0~900 <lprs> = number of loss of power seconds, 0~900 <ess> = number of error seconds, 0~900 <ffr> = number of failed fast retrains seconds, 0~900 <sesl> = number of severely errored seconds-line, 0~900 <uasl> = number of unavailable seconds-line, 0~900 <fru> = fast rate up in Kbps, 0~2147483 <iru> = interleave rate up in Kbps, 0~2147483 <frd> = fast rate down in Kbps, 0~2147483 <ird> = interleave rate down in Kbps, 0~2147483 <ift> = init failure trap enable, 1-enable, 0-disable	M
		show	[<profile>]	Lists the ADSL alarm profiles or a specific profile's settings.	L
	alarmshdsl			SHDSL alarm profiles allow efficient configuration of SHDSL alarm settings.	
		delete	<profile>	Removes an unreferenced SHDSL alarm profile.	M
		map	<profile>	Displays which SHDSL ports reference this alarm profile.	L

Table 172 profile Commands (continued)

COMMAND				DESCRIPTION	P
		set	<profile> [atten <atten>] [snrmgn <snrmgn>] [es <es>] [ses <ses>][crc <crc>] [losws <losws>] [uas <uas>]	Creates a profile of SHDSL alarm settings. <profile> = profile name, up to 31 characters <atten> = loop attenuation threshold, 0~127 <snrmgn> = snr margin threshold, 0~15 <es> = number of errored seconds, 0~900 <ses> = severely errored seconds, 0~900 <crc> = the number of CRC anomalies, >=0 <losws> = number of loss of sync word seconds, 0~900 <uas> = number of unavailable seconds, 0~900	M
		show	[<profile>]	Lists the SHDSL alarm profiles or a specific profile's settings.	L
	alarmadsl			ADSL alarm profiles allow efficient configuration of ADSL alarm settings.	
		delete	<profile>	Removes an unreferenced ADSL alarm profile.	M
		map	<profile>	Displays which ADSL ports reference this alarm profile.	L

Table 172 profile Commands (continued)

COMMAND				DESCRIPTION	P
		set	<profile> atuc [lofs <lofs>] [loss <loss>] [lols <lols>] [lprs <lprs>] [ess <ess>] [ffr <ffr>] [sesl <sesl>] [uasl <uasl>] [fru <fru>] [iru <iru>] [frd <frd>] [ird <ird>] [ift <ift>] or <profile> atur [lofs <lofs>] [loss <loss>] [lprs <lprs>] [ess <ess>] [sesl <sesl>] [uasl <uasl>] [fru <fru>][iru <iru>][frd <frd>] [ird <ird>]	Creates a profile of ADSL alarm settings. <profile> = profile name, up to 31 characters atuc = near end atur = far end <lofs> = number of loss of framing seconds, 0~900 <loss> = number of loss of signal seconds, 0~900 <lols> = number of loss of link seconds, 0~900 <lprs> = number of loss of power seconds, 0~900 <ess> = number of error seconds, 0~900 <ffr> = number of failed fast retrains seconds, 0~900 <sesl> = number of severely errored seconds-line, 0~900 <uasl> = number of unavailable seconds-line, 0~900 <fru> = fast rate up in Kbps, 0~2147483 <iru> = interleave rate up in Kbps, 0~2147483 <frd> = fast rate down in Kbps, 0~2147483 <ird> = interleave rate down in Kbps, 0~2147483 <ift> = init failure trap enable, 1-enable, 0-disable	M
		show	[<profile>]	Lists the ADSL alarm profiles or a specific profile's settings.	L
	alarmvdsl			VDSL alarm profiles allow efficient configuration of VDSL alarm settings.	
		delete	<profile>	Removes an unreferenced VDSL alarm profile.	M
		map	<profile>	Displays which VDSL ports reference this alarm profile.	L

Table 172 profile Commands (continued)

COMMAND				DESCRIPTION	P
		set	<profile> [lofs <lofs>] [loss <loss>] [lols <lols>] [lprs <lprs>] [ess <ess>] [sesl <sesl>] [uasl <uasl>] [ift <ift>]	Creates a profile of VDSL alarm settings. <profile> = profile name, up to 31 characters <lofs> = number of loss of framing seconds, 0~900 <loss> = number of loss of signal seconds, 0~900 <lols> = number of loss of link seconds, 0~900 <lprs> = number of loss of power seconds, 0~900 <ess> = number of error seconds, 0~900 <sesl> = number of severely errored seconds-line, 0~900 <uasl> = number of unavailable seconds-line, 0~900 <ift> = init failure trap enable, 1-enable, 0-disable	M
		show	[<profile>]	Lists the VDSL alarm profiles or a specific profile's settings.	L
	atm			ATM traffic profiles allow efficient configuration of ATM traffic settings.	
		delete	<profile>	Removes an unreferenced ATM traffic profile.	M
		map	<profile>	Displays which ports reference this ATM profile.	L
		set	<atmprofile> cbr|ubr <pcr> <cdvt> or <atmprofile> rt-vbr|nrt-vbr <pcr> <cdvt> <scr> <bt>	Creates a profile of ATM traffic settings. cbr = constant cell rate ubr = unspecified cell rate rt-vbr = realtime variable bit rate nrt-vbr = non-realtime variable bit rate <pcr> = peak cell rate, 150~300000 <scr> = sustainable cell rate, 150~300000 <cdvt> = cell delay variation tolerance, 0~255 <bt> = burst tolerance, 0~255 Note: <pcr>, <cdvt>, <scr> and <bt> can be inputted '*' as default value Note: use "*" to set <pcr>, <cdvt>, <scr> or <bt> to the default value.	M
		show	[<profile>]	Lists the ATM traffic profiles or a specific profile's settings.	L
	igmpfilter			IGMP filter profiles allow you to control access to IGMP multicast groups.	
		delete	<igmpfilter>	Removes an unreferenced IGMP filter profile.	M

Table 172 profile Commands (continued)

COMMAND				DESCRIPTION	P
		map	<igmpfilter>	Displays which ports reference this IGMP filter profile.	L
		set	<igmpfilter> <index> <startip> <endip>	Creates an IGMP filter profile of ATM traffic settings. <igmpfilter> = profile name <index> = index of address, 1~16 <startip> = start of address range <endip> = end of address range	M
		show	[igmpprofile]	Lists the IGMP filter profiles or a specific profile's settings.	L
	profsvr	show		Displays the current profile server setting.	L
		mode	client|server	Sets the profile server operation mode.	M
		clientlist	set <ip> <type>	Adds an entry to the profile server client list.	M
			delete <ip>	Removes an entry from the profile server client list.	M
			show	Displays the profile server client list.	L
		serverset	<ip>	Sets the target profile server IP address for synchronization.	M
		sync		Synchronize with the profile server.	M
	shdsl			SHDSL profiles allow efficient configuration of SHDSL port settings.	
		delete	<profile>	Removes an unreferenced SHDSL port settings profile.	M
		map	<profile>	Displays which SHDSL ports reference this profile.	L
		set	<profile> <min-rate> <max-rate> [annexa|annexb 2wire|4wire|mpair4 [lp_off | lp_on_cur [curr_margin] | lp_on_wc [worst_margin]]]	Creates a profile of SHDSL port settings. <min-rate> = minimum rate, 192~4096 in Kbps <max-rate> = maximum rate, 192~4096 in Kbps annexa|annexb = regional setting, 'annexb' by default <wire-pair> = the number of wire pairs to be used, '2wire' by default lp_off = disable line probe, default line probe mode lp_on_cur = enable line probe with current target snr margin lp_on_wc = enable line probe with worst case target snr margin <curr-margin> = current condition target snr margin, -10~21 in dB <worst-margin> = worse case noise margin, -10~21 in dB	M
		show	[<profile>]	Lists the SHDSL port setting profiles or a specific profile's settings.	L

Table 172 profile Commands (continued)

COMMAND				DESCRIPTION	P
	vdsl			VDSL profiles allow efficient configuration of VDSL port settings.	
		delete	<profile>	Removes a VDSL port settings profile.	M
		map	<profile>	Displays which VDSL ports reference this profile.	L
		set	<profile> <us-max-rate> <ds-max-rate> [fast|delay <us-delay> <ds-delay>] [minrate <us-min-rate> <ds-min-rate>] [usmgn <us-max-mgn> <us-min-mgn> <us-tgt-mgn>] [dsmgn <ds-max-mgn> <ds-min-mgn> <ds-tgt-mgn>]	Creates a VDSL line profile. “us” is UpStream, “ds” is DownStream us maximum rate = 64~45440 in Kbps ds maximum rate = 64~100032 in Kbps us/ds delay = 1~255 in ms us minimum rate = 64~4096 in Kbps ds minimum rat e= 64~32000 in Kbps max noise margin = 0~310 in 0.1 dB min. noise margin = 0~310 in 0.1 dB target noise margin = 0~310 in 0.1 dB	M
		show	[<profile>]	Lists the VDSL port setting profiles or a specific profile’s settings.	L

28.3 profile acl Commands

An ACL (Access Control Logic) profile allows the system to classify and perform actions on the upstream traffic.

28.3.1 profile acl delete Command

Syntax:

```
profile acl delete <profile>
```

This command removes the specified ACL profile.

You cannot remove the ACL profile(s) that is currently in use.

28.3.2 profile acl map Command

Syntax:

```
profile acl map <profile>
```

This command displays the DSL port(s) to which the specified ACL profile is applied.

The following example displays the port mapping table for the `example` ACL profile.

```
ras> profile acl map example
 port pvc
----- ------------------------------------------------------
 3- 1 0-33
```

28.3.3 profile acl set Command

Syntax:

```
profile acl set <rule> <action>
```

where

`<rule>` = The rule that classifies traffic flows. Ordering of the criteria is important. The system first compares the layer 2 fields first, the layer 3 fields and then the protocol type.

The following lists the set of criteria you can configure.

- `ether <etype> vlan <vid>`
- `ether <etype> srcmac <mac>`
- `ether <etype> dstmac <mac>`
- `vlan < vid > srcmac <mac>`
- `vlan < vid > dstmac <mac>`
- `srcmac < mac > dstmac <mac>`
- `vlan < vid > pri <priority>`
- `ether <etype>`
- `vlan <vid>`
- `srcmac <mac>`
- `dstmac <mac>`
- `pri <priority>`
- `protocol <protocol>`
- `[srcip <ip>/<mask>[stip <ip>/<mask>[tos <tos>[srcport <port>[dstport <port>]]]]]`

where

- `ethper <etype>` = Ethernet type (0~65535).
- `vlan <vid>` = VLAN ID (1~4094).
- `srmac <mac>` = Source MAC address.
- `drmac <mac>` = Destination MAC address.
- `priority <priority>` = Priority (0 ~ 7)
- `protocol <protocol>` = Protocol type: `tcp`, `udp`, `ospf`, `igmp`, `ip`, `gre`, `icmp` or user specified.
- `dstip <ip>/<mask>` = Destination IP address and subnet mask.
- `srcip <ip>/<mask>` = Source IP address and subnet mask.
- `tos <stos> <etos>` = Sets the ToS (Type of Service) range between 0 and 255.
- `dstport <sport> <eport>` = Destination port range.
- `srcport <sport> <eport>` = Source port range.

`<action>` = The action(s) to perform on the classified packets. The following lists the actions you can set.

- `rate <rate>` = Sets the transmission rate (1~65535 in kbps) for the matched traffic.
- `rvlan <rvlan>` = Replaces the VLAN ID with this VLAN ID (1~4094).
- `rpri <rpri>|deny` = Replaces the priority with this priority (0 ~7) of the matched packets or drops (`deny`) the packets.

This command configures an ACL rule to classify the upstream traffic and perform action(s) on the classified traffic.

The following creates an ACL rule example named `test` for traffic from VLAN 10 with a priority level of 2. This rule limits the rate on the classified traffic to 1000 kbps and changes the priority level to 7.

```
ras> profile acl set test vlan 10 priority 2 rate 1000 rpri 7
```

28.3.3.1 Configuration Guidelines

- You can apply one classifier for a protocol on a port's PVC.
- You cannot create a classifier that contains matching criteria for layer 2 and layer 3 fields. For example `profile acl set test protocol tcp vlan 15 deny` is not allowed as protocol type and VLAN do not belong to the same network layer.
- Each type of criteria can only be used once in a classifier. For example, `profile acl set test protocol tcp protocol udp deny` is not allowed. For this example, you need to create a separate classifier for each protocol and apply them to the same PVC(s).

28.3.4 profile acl show Command

Syntax:

```
profile acl show [<profile>]
```

This command displays the name(s) of the profile(s) you have configured.

```
ras> profile acl show
acl profile(s):
--------------
1. example
ras>
```

28.4 profile adsl Commands

Use the `profile adsl` commands to configure ADSL profiles.

28.4.1 profile adsl set Command

Syntax:

```
profile adsl set <profile> <us-max-rate> <ds-max-rate>
 [fast|delay <us-delay> <ds-delay>]
 [minrate <us-min-rate> <ds-min-rate>]
 [usmgn <us-max-mgn> <us-min-mgn> <us-tgt-mgn>]
 [dsmgn <ds-max-mgn> <ds-min-mgn> <ds-tgt-mgn>]
 [usra fixed|startup|runtime <us-us-mgn> <us-ds-mgn>]
 [dsra fixed|startup|runtime <ds-us-mgn> <ds-ds-mgn>]
```

where

`<profile>`	=	The descriptive name for the profile.
`<us-max-rate>`	=	The maximum ADSL upstream transmission rate, 64~4096 in Kbps. The upstream rate must be less than or equal to the downstream rate.
`<ds-max-rate>`	=	The maximum ADSL downstream transmission rate, 64~32000 in Kbps.

[fast|delay <us-delay> <ds-delay>]	=	The latency mode. With interleave, you must also define the upstream and downstream delay (1-255 ms). It is recommended that you configure the same delay for both upstream and downstream.
[minrate <us-min-rate> <ds-min-rate>]	=	The minimum ADSL upstream transmission rate (32~4096 Kbps) and the minimum ADSL downstream transmission rate (32~32000 Kbps).
[usmgn <us-max-mgn> <us-min-mgn> <us-tgt-mgn>]	=	The maximum, minimum and target acceptable ADSL upstream signal to noise margins (0~310 in 0.1 dB measurements).
[dsmgn <ds-max-mgn> <ds-min-mgn> <ds-tgt-mgn>]	=	The maximum, minimum and target acceptable ADSL downstream signal to noise margins (0~310 in 0.1 dB measurements).
usra	=	The upstream rate adaptation setting. fixed = no rate adaptation startup = rate adaptation at initialization runtime = rate adaptation any time
dsra	=	The downstream rate adaptation setting.
<us-us-mgn>	=	The upstream up shift noise margin (0~310 in 0.1 dB).
<us-ds-mgn>	=	The upstream down shift noise margin (0~310 in 0.1 dB).
<ds-us-mgn>	=	The downstream up shift noise margin (0~310 in 0.1 dB).
<ds-ds-mgn>	=	The downstream down shift noise margin (0~310 in 0.1 dB).

The profile is a list of ADSL line configuration settings. After you create an ADSL profile, you can assign it to any of the ADSL ports on any of the ADSL line cards.

Note that the default value will be used for any of the above fields that are omitted.

The ADSL up/down shift noise margins define the threshold that triggers rate adaptation. For example:

The target SNR is 6, and the up/down shift noise margins are 9/3

If the signal becomes better and the SNR is higher than 9, rate adaptation is triggered and the line rate becomes higher

If the signal becomes bad and the SNR is lower then 3, rate adaptation is triggered and the line rate becomes lower.

The following example creates a premium profile (named gold) for providing subscribers with very high connection speeds and no interleave delay. It uses the following settings.

- The maximum upstream rate is set to 2048 Kbps.
- The maximum downstream rate is set to 16000 Kbps.
- No interleave delay.
- The minimum upstream is set to 1024 Kbps.

- The minimum downstream is set to 3072 Kbps.
- The maximum, minimum and target acceptable ADSL upstream signal to noise margins are set to 12, 0 and 6 dB respectively.
- The maximum, minimum and target acceptable ADSL downstream signal to noise margins are also set to 12, 0 and 6 dB respectively.
- Upstream and downstream rate adaptation are both set to operate whenever the link is up.
- The upstream up/down shift noise margins are set to 9/3 dB.
- The downstream up/down shift noise margins are set to 9/3 dB.

```
ras> profile adsl set gold 2048 16000 fast minrate 1024 3072 usmgn 120 0 60
dsmgn 120 0 60 usra runtime 90 30 dsra runtime 90 30
```

This next example creates a similar premium profile (named goldi), except it sets an interleave delay of 16 ms for both upstream and downstream traffic.

```
ras> profile adsl set gold 2048 16000 delay 16 16 minrate 1024 3072 usmgn 120
0 60 dsmgn 120 0 60 usra runtime 90 30 dsra runtime 90 30
```

28.4.2 profile adsl map Command

Syntax:

```
profile adsl map <profile>
```

where

`<profile>` = The name of the profile.

This command displays which ADSL ports reference a specific profile.

The following example displays which ADSL ports use the gold profile.

```
ras> profile adsl map gold
```

28.4.3 profile adsl delete Command

Syntax:

```
profile adsl delete <profile>
```

where

`<profile>` = A profile name.

This command allows you to delete an individual ADSL profile by its name. You cannot delete a profile that is assigned to any of the DSL ports in the MSC1000G. Assign a different profile to any DSL ports that are using the profile that you want to delete, and then you can delete the profile.

The following example deletes the gold ADSL profile.

```
ras> adsl profile delete gold
```

28.4.4 profile adsl show Command

Syntax:

```
profile adsl show [<profile>]
```

where

`<profile>` = A profile name.

This command displays the details of the specified ADSL profile or lists all of the ADSL profiles if you do not specify one.

The following example displays the ADSL profile named gold.

```
ras> profile adsl show gold
adsl profile: gold
                        upstream  downstream
                        --------  ----------
  max rate      (Kbps):     2048       16000
  min rate      (Kbps):     1024        3072
  latency delay   (ms):     fast        fast
  max margin      (dB):     12.0        12.0
  min margin      (dB):      0.0         0.0
  target margin   (dB):      6.0         6.0
  sra mode             :  runtime     runtime
  up shift mgn    (dB):      9.0         9.0
  down shift mgn  (dB):      3.0         3.0
```

28.5 profile alarmadsl Commands

Configure alarmadsl profiles to set alarm settings and thresholds for the ADSL ports.

28.5.1 profile alarmadsl show Command

Syntax:

```
profile alarmadsl show [<profile>]
```

where

`<profile>` = The name of an alarm profile.

This command displays the details of the specified alarm ADSL profile or lists all of the alarm ADSL profiles if you do not specify one.

The following example displays the default alarm ADSL profile (DEFVAL).

```
ras> profile alarmadsl show DEFVAL
adsl alarm profile : DEFVAL
                                        atuc       atur
                                    ---------- ----------
  15MinLofs(lofs)           (sec):          0          0
  15MinLoss(loss)           (sec):          0          0
  15MinLols(lols)           (sec):          0          -
  15MinLprs(lprs)           (sec):          0          0
  15MinESs(ess)             (sec):          0          0
  15MinFailedFastR(ffr)     (sec):          0          -
  15MinSesL(sesl)           (sec):          0          0
  15MinUasL(uasl)           (sec):          0          0
  FastRateUp(fru)          (kbps):          0          0
  InterleaveRateUp(iru)    (kbps):          0          0
  FastRateDown(frd)        (kbps):          0          0
  InterleaveRateDown(ird)  (kbps):          0          0
  InitFailureTrap(ift)           :          -          -
ras>
```

28.5.2 profile alarmadsl set Command

Syntax:

```
profile alarmadsl set <profile> atuc [lofs <lofs>] [loss <loss>] [lols
<lols>][lprs <lprs>] [ess <ess>] [ffr <ffr>] [sesl <sesl>] [uasl <uasl>]
[fru <fru>] [iru <iru>] [frd <frd>] [ird <ird>] [ift <ift>]

or <profile> atur [lofs <lofs>] [loss <loss>] [lprs <lprs>][ess <ess>] [sesl
<sesl>] [uasl <uasl>] [fru <fru>][iru <iru>][frd <frd>] [ird <ird>]
```

where

`<profile>`	=	A name for the alarm profile (up to 31 English keyboard characters).
`atuc`	=	Downstream. These parameters are for the connection (or traffic) going from the IES-5000 to the subscriber's device.
`atur`	=	Upstream. These parameters are for the connection (or traffic) coming from the subscriber's device to the IES-5000.
`<lofs>`	=	The number of Loss Of Frame Seconds (0~900) that are permitted to occur within 15 minutes.
`<loss>`	=	The number of Loss Of Signal Seconds (0~900) that are permitted to occur within 15 minutes.
`<lols>`	=	The number of Loss Of Link Seconds (0~900) that are permitted to occur within 15 minutes.
`<lprs>`	=	The Number of Loss of PoweR seconds (0~900) permitted to occur (on the ATUR) within 15 minutes.
`<ess>`	=	The number of Errored SecondS (0~900) that are permitted to occur within 15 minutes.

<ffr>	=	The number of Failed Fast Retrain seconds (0~900) that are permitted to occur within 15 minutes.
<sesl>	=	The number of Severely Errored Seconds (0~900) that are permitted to occur within 15 minutes.
<uasl>	=	The number of UnAvailable Seconds (0~900) that are permitted to occur within 15 minutes.
<fru>	=	A rate in kilobits per second (Kbps). If a fast mode connection's upstream transmission rate increases by more than this number, then a trap is sent.
<iru>	=	A rate in kilobits per second (Kbps). If an interleave mode connection's upstream transmission rate increases by more than this number, then a trap is sent.
<frd>	=	A rate in kilobits per second (Kbps). If a fast mode connection's downstream transmission rate decreases by more than this number, then a trap is sent.
<ird>	=	A rate in kilobits per second (Kbps). If an interleave mode connection's downstream transmission rate decreases by more than this number, then a trap is sent.
<ift>	=	"1" sets the profile to trigger an alarm for an initialization failure trap. "0" sets the profile to not trigger an alarm for an initialization failure trap.

The `alarmprofile set` command configures ADSL port alarm thresholds. The MSC1000G sends an alarm trap and generates a syslog entry when the thresholds of the alarm profile are exceeded.

Configure `alarmadsl` profiles first and then use the `port adsl alarmprof` command to use them with specific ADSL ports.

The following example sets an alarm profile named SESalarm that has the MSC1000G send an alarm trap and generate a syslog whenever the atuc connection (from the IES-5000 to the subscriber) has more than 3 severely errored seconds within a 15 minute period.

```
ras> profile alarmadsl set SESalarm atuc ses 3
```

28.5.3 profile alarmadsl delete Command

Syntax:

```
profile alarmadsl delete <profile>
```

where

<profile>	=	The name of an alarm profile.

This command allows you to delete an individual ADSL alarm profile by its name. You cannot delete the DEFVAL alarm profile.

The following example deletes the SESalarm alarm profile.

```
ras> profile alarmadsl delete SESalarm
```

28.5.4 profile alarmadsl map Command

Syntax:

```
profile alarmadsl map <profile>
```

where

`<profile>` = The name of an alarm profile.

This command displays which ADSL ports are set to use the specified alarmadsl profile.

The following example displays which ADSL ports use the SESalarm alarmadsl profile.

```
ras> profile alarmadsl map SESalarm
```

28.6 profile alarmshdsl Commands

Configure alarmshdsl profiles to set alarm settings and thresholds for the SHDSL ports.

28.6.1 profile alarmshdsl show Command

Syntax:

```
profile alarmshdsl show [<profile>]
```

where

`<profile>` = A profile name.

This command displays the details of the specified alarm SHDSL profile or lists all of the alarm SHDSL profiles if you do not specify one.

The following example displays the default alarm SHDSL profile (DEFVAL).

```
ras> profile alarmshdsl show DEFVAL
shdsl alarm profile : DEFVAL
  loop attenuation(atten)   (dB):         0
  snr margin(snrmgn)        (dB):         0
  es                       (sec):         0
  ses                      (sec):         0
  crc anomalies(crc)              :       0
  losws                    (sec):         0
  uas                      (sec):         0
ras>
```

28.6.2 profile alarmshdsl set Command

Syntax:

```
<profile> [atten <atten>] [snrmgn <snrmgn>] [es <es>] [ses <ses>][crc <crc>]
[losws <losws>] [uas <uas>]
```

where

`<profile>`	=	A name for the alarm profile (up to 31 English keyboard characters).
`<atten>`	=	The permitted loop attenuation of a port, 0~127
`<snrmgn>`	=	The permitted signal to noise ratio margin, 0~15.
`<ess>`	=	The number of Errored SecondS (0~900) that are permitted to occur within 15 minutes.
`<ses>`	=	The number of Severely Errored Seconds (0~900) that are permitted to occur within 15 minutes.
`<crc>`		The number of Cyclic Redundancy Checking anomalies that are permitted to occur within 15 minutes.
`<losws>`		The number of Loss Of Sync Word Seconds (0~900) that are permitted to occur within 15 minutes.
`<uas>`	=	The number of UnAvailable Seconds (0~900) that are permitted to occur within 15 minutes.

This command configures SHDSL port alarm thresholds. The MSC1000G sends an alarm trap and generates a syslog entry when the thresholds of the alarm profile are exceeded.

Configure `alarmshdsl` profiles first and then use the `port shdsl alarmprof` command to to use them with specific SHDSL ports.

The following example sets an alarm profile named SESalarm that has the MSC1000G send an alarm trap and generate a syslog whenever the connection's number of severely errored seconds exceeds three within a 15 minute period.

```
ras> profile alarmshdsl set SESalarm ses 3
```

28.6.3 profile alarmshdsl delete Command

Syntax:

```
profile alarmshdsl delete <profile>
```

where

`<profile>`	=	The name of an alarm profile.

This command allows you to delete an individual SHDSL alarm profile by its name. You cannot delete the DEFVAL alarm profile.

The following example deletes the SESalarm alarm profile.

```
ras> profile alarmshdsl delete SESalarm
```

28.6.4 profile alarmshdsl map Command

Syntax:

`profile alarmshdsl map <profile>`

where

`<profile>` = The name of an alarm profile.

This command displays which SHDSL ports are set to use the specified alarmshdsl profile.

The following example displays which SHDSL ports use the SESalarm alarmshdsl profile.

```
ras> profile alarmshdsl map SESalarm
```

28.7 profile alarmvdsl Commands

Configure alarmadsl profiles to set alarm settings and thresholds for the VDSL ports.

28.7.1 profile alarmvdsl show Command

Syntax:

`profile alarmvdsl show [<profile>]`

where

`<profile>` = The name of an alarm profile.

This command displays the details of the specified alarm VDSL profile or lists all of the alarm VDSL profiles if you do not specify one.

The following example displays the default alarm VDSL profile (DEFVAL).

```
ras> profile alarmvdsl show DEFVAL
vdsl alarm profile : DEFVAL
  initFailure(ift)              :         -
  15MinLofs(lofs)          (sec):         0
  15MinLoss(loss)          (sec):         0
  15MinLols(lols)          (sec):         0
  15MinLprs(lprs)          (sec):         0
  15MinESs(ess)            (sec):         0
  15MinSesL(sesl)          (sec):         0
  15MinUasL(uasl)          (sec):         0
ras>
```

28.7.2 profile alarmvdsl set Command

Syntax:

```
profile alarmadsl set <profile> [lofs <lofs>] [loss <loss>] [lols <lols>]
[lprs <lprs>] [ess <ess>] [sesl <sesl>] [uasl <uasl>] [ift <ift>]
```

where

`<profile>`	=	A name for the alarm profile (up to 31 English keyboard characters).
`<lofs>`	=	The number of Loss Of Frame Seconds (0~900) that are permitted to occur within 15 minutes.
`<loss>`	=	The number of Loss Of Signal Seconds (0~900) that are permitted to occur within 15 minutes.
`<lols>`	=	The number of Loss Of Link Seconds (0~900) that are permitted to occur within 15 minutes.
`<lprs>`	=	The Number of Loss of PoweR seconds (0~900) permitted to occur (on the ATUR) within 15 minutes.
`<ess>`	=	The number of Errored SecondS (0~900) that are permitted to occur within 15 minutes.
`<sesl>`	=	The number of Severely Errored Seconds (0~900) that are permitted to occur within 15 minutes.
`<uasl>`	=	The number of UnAvailable Seconds (0~900) that are permitted to occur within 15 minutes.
`<iru>`	=	A rate in kilobits per second (Kbps). If an interleave mode connection's upstream transmission rate increases by more than this number, then a trap is sent.
`<ift>`	=	"1" sets the profile to trigger an alarm for an initialization failure trap. "0" sets the profile to not trigger an alarm for an initialization failure trap.

The `alarmprofile set` command configures VDSL port alarm thresholds. The MSC1000G sends an alarm trap and generates a syslog entry when the thresholds of the alarm profile are exceeded.

Configure `alarmvdsl` profiles first and then use the `port vdsl alarmprof` command to use them with specific VDSL ports.

The following example sets an alarm profile named SESalarm that has the MSC1000G send an alarm trap and generate a syslog whenever the connection (from the IES-5000 to the subscriber) has more than 3 severely errored seconds within a 15-minute period.

```
ras> profile alarmvdsl set SESalarm sesl 3
```

28.7.3 profile alarmvdsl delete Command

Syntax:

```
profile alarmvdsl delete <profile>
```

where

`<profile>` = The name of an alarm profile.

This command allows you to delete an individual VDSL alarm profile by its name. You cannot delete the DEFVAL alarm profile.

The following example deletes the SESalarm alarm profile.

```
ras> profile alarmvdsl delete SESalarm
```

28.7.4 profile alarmvdsl map Command

Syntax:

```
profile alarmvdsl map <profile>
```

where

`<profile>` = The name of an alarm profile.

This command displays which VDSL ports are set to use the specified alarmadsl profile.

The following example displays which VDSL ports use the SESalarm alarmadsl profile.

```
ras> profile alarmvdsl map SESalarm
slot side                      port
---- ---- ------------------------------------------------
                1         2         3         4
          12345678901234567890123456789012345678901234567890
   2    - --------------------------------------------------
   3    - --------------------------------------------------
   4    - --------------------------------------------------
   5    - --------------------------------------------------
ras>
```

28.8 profile atm Commands

Use these commands to configure ATM traffic settings.

28.8.1 profile atm show Command

Syntax:

```
profile atm show [<profile>]
```

where

<profile>	=	A profile name.

This command displays the details of the specified ATM profile or lists all of the ATM profiles if you do not specify one.

The following example displays the DEFVAL ATM profile.

```
ras> profile atm show DEFVAL
atm profile: DEFVAL
  traffic class: ubr
  pcr          : 300000
  cdvt         : 0
ras>
```

28.8.2 profile atm set Command

Syntax:

```
profile atm set <atmprofile> cbr|ubr <pcr> <cdvt>

or
profile atm set <atmprofile> rt-vbr|nrt-vbr <pcr> <cdvt> <scr> <bt>
```

where

<atmprofile>	=	The name of the ATM profile (up to 31 English keyboard characters). You cannot change the **DEFVAL** profile.
<ubr|cbr>	=	The ubr (unspecified bit rate) or cbr (constant bit rate) ATM traffic class.
<pcr>	=	Peak Cell Rate (150~300000), the maximum rate (cells per second) at which the sender can send cells. * sets the default value.
[cdvt]	=	Cell Delay Variation Tolerance is the accepted tolerance of the difference between a cell's transfer delay and the expected transfer delay (number of cells). 0 to 255 cells or * for the default value.
rt-vbr)|nrt-vbr	=	The Real-Time Variable Bit Rate (vbr) or Non Real-Time Variable Bit Rate (nrt-vbr) Variable Bit Rate ATM traffic class.
<scr>	=	The Sustainable Cell Rate (150~300000) sets the average cell rate (long-term) that can be transmitted (cells per second). SCR applies with the vbr traffic class. * sets the default value.
<bt>	=	Burst Tolerance this is the maximum number of cells (0~255) that the port is guaranteed to handle without any discards. BT applies with the vbr traffic class. * sets the default value.

This command creates a profile of ATM traffic settings.

After you create an ATM profile, you can use it with the `port ppvc set` or `port pvc set` command to assign it to a virtual circuit.

The following example creates an ATM profile named gold. It uses constant bit rate and has the maximum rate (peak cell rate) set to 300,000 cells per second. The acceptable tolerance of the difference between a cell's transfer delay and the expected transfer delay (CDVT) is set to 5 cells.

```
ras> profile atm set gold cbr 300000 5
```

The following example creates an ATM profile named silver. It uses real-time variable bit rate and has the maximum rate (peak cell rate) set to 250,000 cells per second. The acceptable tolerance of the difference between a cell's transfer delay and the expected transfer delay (CDVT) is set to 5 cells. The average cell rate that can be transmitted (SCR) is set to 100,000 cells per second. The maximum number of cells that the port is guaranteed to handle without any discards (BT) is set to 200.

```
ras> profile atm set silver rt-vbr 250000 5 100000 200
```

The following example creates an ATM profile named economy. It uses unspecified bit rate and has the maximum rate (peak cell rate) set to 10,000 cells per second. The acceptable tolerance of the difference between a cell's transfer delay and the expected transfer delay (CDVT) is set to 100 cells.

```
ras> profile atm set economy ubr 10000 100
```

28.8.3 profile atm delete Command

Syntax:

`profile atm delete <profile>`

where

`<profile>` = The name of a profile.

This command allows you to delete an individual ATM profile by its name. You cannot delete the DEFVAL profile.

You cannot delete an ATM profile that is assigned to any of the PVCs or PPVCs. Assign a different profile to any PVCs or PPVCs that are using the profile that you want to delete, and then you can delete the profile.

The following example deletes the silver ATM profile.

```
ras> profile atm delete silver
```

28.8.4 profile atm map Command

Syntax:

```
profile atm map <profile>
```

where

`<profile>` = The name of a profile.

This command displays which PVCs or PPVCs are set to use the specified ATM profile.

The following example displays which PVCs or PPVCs use the silver profile.

```
ras> profile atm map silver
```

28.9 Profile Server

The profile server feature manages profiles on multiple IES-5000's. You can configure profiles on one IES-5000 that you set to server mode. When you want to configure another IES-5000, you can set it to client mode to get the profile settings from (synchronize with) the IES-5000 in server mode. If you change the profile settings on the IES-5000 in server mode, you can have it synchronize the profile settings on the clients to match.

28.10 profile profsvr Commands

Use these commands to configure the profile server feature settings.

28.10.1 profile profsvr show Command

Syntax:

```
profile profsvr show
```

This command displays the current profile server setting.

```
ras> profile profsvr show
mode     :server mode
no       Client Ip      type
----  ---------------  ------
01          1.2.3.4       0
```

28.10.2 profile profsvr mode Command

Syntax:

```
profile profsvr mode client|server
```

This command sets the profile server operation mode.

```
ras> profile profsvr mode server
```

28.10.3 profile profsvr clientlist set Command

Syntax:

```
profile profsvr clientlist set <ip> <type>
```

where

`<type>`	=	A profile client IES-5000 may have unused profiles on it (profiles that are not mapped to any ports). Use `0` to leave these unused profiles on the client IES-5000 when synchronizing the profiles. Use `1` to delete these unused profiles from the client IES-5000 when synchronizing the profiles.

This command adds an entry to the profile server client list. When the IES-5000 is in server mode, use this command to add entries to the list of client IES-5000's.

The following example sets a profile server client entry for an IES-5000 at IP address 1.2.3.4. If there are any unused profiles on this client during the synchronization process, they will be left on the client.

```
ras> profile profsvr clientlist set 1.2.3.4 0
```

28.10.4 profile profsvr clientlist delete Command

Syntax:

```
profile profsvr clientlist delete <ip>
```

This command removes an entry from the profile server client list.

The following example removes a profile server client entry for an IES-5000 at IP address 1.2.3.4.

```
ras> profile profsvr clientlist delete 1.2.3.4
```

28.10.5 profile profsvr clientlist show Command

Syntax:

```
profile profsvr clientlist show <ip>
```

This command displays the profile server client list.

```
ras> profile profsvr clientlist show
no       Client Ip      type
----  ---------------  ------
01          1.2.3.4       0
02          1.2.3.5       0
```

28.10.6 profile profsvr serverset Command

Syntax:

```
profile profsvr serverset <ip>
```

This command sets the target profile server IP address for synchronization. When the IES-5000 is in client mode, use this command to specify the IP address of the IES-5000 in server mode.

The following example sets an IP address of 5.6.7.8 to use in synchronizing profile settings.

```
ras> profile profsvr serverset 5.6.7.8
```

28.10.7 profile profsvr sync Command

Syntax:

```
profile profsvr sync
```

This command has the IES-5000 synchronize it's profile settings. If the IES-5000 is in client mode, it will attempt to get profile settings from the IES-5000 in server mode. If the IES-5000 is in server mode, it will send its profile settings to the IES-5000's in the profile server client list.

28.11 profile shdsl Commands

Use the `profile shdsl` commands to configure SHDSL profiles.

28.11.1 profile shdsl set Command

Syntax:

```
profile shdsl set <profile> <min-rate> <max-rate>
 [annexa|annexb 2wire|4wire|mpair4
 [lp_off | lp_on_cur [curr_margin] | lp_on_wc [worst_margin]]]
```

where

`<profile>`	=	The descriptive name for the profile.
`<min-rate>`	=	The minimum transmission rate in Kbps. (192~4096)
`<max-rate>`	=	The maximum transmission rate in Kbps. (192~4096)
`annexa|annexb`	=	The region setting, annexb is the default. `annexa` = DSL over POTS. `annexb` = DSL over ISDN.

2wire|4wire|mpair4	=	The wire pair number. 2wire = a normal connection using a single SHDSL port's two wires, this is the default. 4wire = a 4-wire n-wire group (two SHDSL ports grouped together). mpair4 = an 8-wire n-wire group (four SHDSL ports grouped together).
lp_off	=	Disable line probe. The SHDSL line card and subscriber modem use line probes to determine the best possible transmission rate. This is used in rate adaptation. This is the default line probe mode. If you disable line probe, the system skips the rate adaptation phase to shorten connection set up time.
lp_on_cur	=	Enable line probe with current target Signal to Noise Ratio margin.
lp_on_wc	=	Enable line probe with worst case target Signal to Noise Ratio margin.
<curr-margin>	=	The current condition target Signal to Noise Ratio margin, -10 ~ 21 in dB. You only configure this if you enable line probing using the current target Signal to Noise Ratio margin.
<worst-margin>	=	The worst case Signal to Noise Ratio margin, -10 ~ 21 in dB. You only configure this if you enable line probing using the worst case target Signal to Noise Ratio margin.

The profile is a table that contains information on SHDSL line configuration. Each entry in this table reflects a parameter defined by a manager, which can be used to configure the shdsl line. After you create an SHDSL profile, assign it to SHDSL ports on an SHDSL line card.

You must specify at least the profile's name and minimum and maximum rates. The default value will be used for any of the other fields that you omit.

The minimum transmission rate must be less than or equal to the maximum transmission rate.

When using 4 or 8-wire groups, you must apply the profile to consecutive ports. A profile for a 4-wire group can be used with ports 1,2 or 3,4 or 5,6 and so forth (the first two ports, the second two ports, the third two ports and so on). You cannot use a 4-wire group with ports 2,3 or 4,5. A profile for an 8-wire group can be used with ports 1,2,3,4 or 5,6,7,8 or 9,10,11,12 and so forth (the first four ports, the second four ports, the third four ports and so on). You cannot use an 8-wire group with ports 2,3,4,5 or 4,5,6,7.

The following example creates a premium profile (named gold) for providing subscribers with very high connection speeds. The minimum transmission rate is 2112 Kbps and the maximum transmission rate is 4096. It sets two ports to function as a 4-wire group. It uses Annex A (DSL over POTS). It turns on line probes and has them use the current condition target signal to noise ratio margin which it sets to 5 db.

```
ras> profile shdsl set gold 2112 4096 annexa 4wire lp_on_cur 5
```

28.11.2 profile shdsl map Command

Syntax:

```
profile shdsl map <profile>
```

where

`<profile>` = The name of the profile.

This command displays which SHDSL ports reference a specific profile.

The following example displays which SHDSL ports use the gold profile.

```
ras> profile shdsl map gold
```

28.11.3 profile shdsl delete Command

Syntax:

```
profile shdsl delete <profile>
```

where

<profile> = A profile name.

This command allows you to delete an individual shdsl profile by its name. You cannot delete a profile that is assigned to any of the DSL ports in the MSC1000G. Assign a different profile to any DSL ports that are using the profile that you want to delete, and then you can delete the profile.

The following example deletes the gold SHDSL profile.

```
ras> profile shdsl delete gold
```

28.11.4 profile shdsl show Command

Syntax:

```
profile shdsl show [<profile>]
```

where

`<profile>` = A profile name.

This command displays the details of the specified SHDSL profile or lists all of the SHDSL profiles if you do not specify one.

The following example displays the SHDSL profile named gold.

```
ras> profile shdsl show gold
shdsl profile: gold
  max rate      (Kbps): 4096
  min rate      (Kbps): 2112
  annex mode          : annexa
  wire pair           : 4wire
  line probe          : enable with current target SNR margin
  curr margin     (dB): 5
ras>
```

28.12 profile vdsl commands

Use the `profile shdsl` commands to configure VDSL profiles.

28.12.1 profile vdsl delete command

Syntax:

`profile vdsl delete <profile>`

where

`<profile>` = A profile name.

This command allows you to delete an individual shdsl profile by its name. You cannot delete a profile that is assigned to any of the DSL ports in the MSC1000G. Assign a different profile to any DSL ports that are using the profile that you want to delete, and then you can delete the profile.

The following example deletes the `standard` VDSL profile.

```
ras> profile vdsl delete standard
```

28.12.2 profile vdsl map command

Syntax:

`profile vdsl map <profile>`

This command displays which VDSL ports reference a specific profile.

The following example displays which VDSL ports use the `standard` profile.

```
ras> profile shdsl map standard
```

28.12.3 profile vdsl set command

Syntax:

```
profile vdsl set <profile> <us-max-rate> <ds-max-rate> [fast|delay <us-delay>
<ds-delay>] [minrate <us-min-rate> <ds-min-rate>] [usmgn <us-max-mgn> <us-
min-mgn> <us-tgt-mgn>] [dsmgn <ds-max-mgn> <ds-min-mgn> <ds-tgt-mgn>]
```

where

`<profile>`	=	The descriptive name for the profile.
`<us-max-rate>`	=	The maximum VDSL upstream transmission rate, 64~45440 in Kbps. The upstream rate must be less than or equal to the downstream rate.
`<ds-max-rate>`	=	The maximum VDSL downstream transmission rate, 64~100032 in Kbps.
`[fast|delay <us-delay> <ds-delay>]`	=	The latency mode. With interleave, you must also define the upstream and downstream delay (1-255 ms). It is recommended that you configure the same delay for both upstream and downstream.
`[minrate <us-min-rate> <ds-min-rate>]`	=	The minimum VDSL upstream transmission rate (32~45440 Kbps) and the minimum ADSL downstream transmission rate (32~100032 Kbps).
`[usmgn <us-max-mgn> <us-min-mgn> <us-tgt-mgn>]`	=	The maximum, minimum and target acceptable VDSL upstream signal to noise margins (0~310 in 0.1 dB measurements).
`[dsmgn <ds-max-mgn> <ds-min-mgn> <ds-tgt-mgn>]`	=	The maximum, minimum and target acceptable VDSL downstream signal to noise margins (0~310 in 0.1 dB measurements).

The profile is a list of VDSL line configuration settings. After you create a VDSL profile, you can assign it to any of the VDSL ports on any of the VDSL line cards.

The system rounds the signal to noise margin settings to the nearest multiple of 0.25 dB.

The following example creates a VDSL profile (named `standard`) for providing subscribers with very high connection speeds and no interleave delay. It uses the following settings.

- The maximum upstream rate is set to 2048 Kbps.
- The maximum downstream rate is set to 16000 Kbps.
- No interleave delay.
- The minimum upstream is set to 1024 Kbps.
- The minimum downstream is set to 3072 Kbps.

- The maximum, minimum and target acceptable VDSL upstream signal to noise margins are set to 12, 0 and 6 dB respectively.
- The maximum, minimum and target acceptable VDSL downstream signal to noise margins are also set to 12, 0 and 6 dB respectively.

```
ras> profile vdsl set standard 2048 16000 fast minrate 1024 3072 usmgn 12 0
6 dsmgn 12 0 6
```

This next example creates a similar VDSL profile (named `standardB`), except it sets an interleave delay of 16 ms for both upstream and downstream traffic.

```
ras> profile vdsl set standardB 2048 16000 delay 16 16 minrate 1024 3072 us
mgn 12 0 6 dsmgn 12 0 6
```

28.12.4 profile vdsl show Command

Syntax:

```
profile vdsl show [<profile>]
```

where

`<profile>` = The descriptive name for the profile.

This command displays the VDSL profile list of the settings of a VDSL profile configured on the system.

The following example displays the profile list and the settings of the `standard` profile.

```
ras> profile vdsl show
vdsl profile(s):
----------------------
1. DEFVAL
2. standard
3. standardB

ras> profile vdsl show standard
vdsl profile: standard
                         upstream  downstream
                         --------  ----------
  max rate      (Kbps):     2048       16000
  min rate      (Kbps):     1024        3072
  latency delay   (ms):     fast        fast
  max margin      (dB):      1.2         1.2
  min margin      (dB):      0.0         0.0
  target margin   (dB):      0.6         0.6
ras>
```

29

show Commands

This chapter shows you how to use the `show` commands.

29.1 show Commands Overview

The `show` commands display runtime status information.

29.2 show Commands Summary

The following table lists the `show` commands. The **P** column on the right indicates the administrator privilege level needed to use the command (**H** for high, **M** for middle or **L** for low).

Table 173 show Commands

COMMAND				DESCRIPTION	P
`show`					
	`adsl`	`linedata`	`<slot-port>`	Displays an ADSL port's line bit allocation.	L
		`linegain`	`<slot-port>`		L
		`linehlog`		Displays ADSL line channel characteristics. The format provides magnitude values in a logarithmic scale.	L
		`lineqln`		Displays the Quiet Line Noise for a DMT tone is the rms (root mean square) level of the noise present on the line, when no ADSL signals are present. It is measured in dBm/Hz. The QLN can be used in analyzing crosstalk.	L
		`linetssi`			L
	`arp`			Displays the ARP table.	L
	`atm`	`<slot-port>|<slot-port-vpi/vci> [reset]`		Displays ATM traffic counters.	L
	`dhcp`	`counter`	`<slot>|<slot-port>`	Displays port DHCP statistics.	L

Table 173 show Commands (continued)

COMMAND				DESCRIPTION	P
		snoop	<slot-port>	Displays port DHCP snooping information.	L
	dot3ad			Displays the (IEEE 802.3ad) link aggregation settings.	L
	enet	<giga-port>|<slot>		Displays Ethernet packet counters.	L
	igmp	info		Displays IGMP related statistics.	L
		group	[<vid> <group_ip>]	Displays the learned IGMP group settings and status.	L
		port	info <slot-port>	Displays IGMP related information on the port.	L
			group <slot-port>	Displays joint IGMP group information on the port.	L
	ip			Displays management IP settings.	L
	ipbpvc	arpproxy	all|domain [<domain>]|edgerouter [<ip> <vid>]|interface [<ip/mask> <vid>]	Display whole ARP table. Display learnt ARP table for a domain. Display learnt ARP table for all/an edge router. Display learnt ARP table for all/an interface. Age time information is included.	L
		interface	[<ip/mask>|<vid|<ip/mask> <vid>]	Display runtime interfaces.	L
		route	[<domain>]|[<ip/mask>]|[<domain> <ip/mask>]]	Display runtime routing table.	L
	lineinfo	<slot-port>		Displays DSL line information.	L
	lineperf	<slot-port>		Displays DSL line performance statistics.	L
	linerate	<slot-port>		Displays DSL line rate values.	L
	linestat	<slot-port>		Displays DSL link status.	L
	mac	[<giga-port>|<mac>|<slot>|<slot-port>|vid <vid1>[-<vid2>]]		Displays a port's IEEE 802.1d MAC address forwarding table.	L
	monitor	<slot>		Displays a card's hardware monitor statistics.	L
	mstp	<mstid> [<end_mstid>]		Displays MSTP information for the Ethernet ports.	L
	packet	<slot-port>		Displays a port's packet counter.	L

Table 173 show Commands (continued)

COMMAND				DESCRIPTION	P
	paepvc	counter	<slot-port>|<slot-port-vpi/vci>	Displays PAE PVC counter statistics.	L
		session	<slot-port>|<slot-port-vpi/vci>	Displays PAE PVC session information.	L
	performance	<slot-port> curr|15min|1day		Displays a DSL port's performance counters.	L
	sys			Displays the CPU utilization and memory usage status.	L
	rmon	stats|history <giga-port>		Displays Gigabit Ethernet interface link RMON information.	L
	user			Displays information on logged in users. * denotes your session.	L
	vlan	[<vid>]|[<start-vid> <end-vid>]		Displays current VLANs.	L

29.3 show Commands

Use these commands to display runtime status information.

29.3.1 show adsl Commands

Use the `show adsl` commands to display the line information for an active ADSL line.

29.3.1.1 show adsl linedata Command

Syntax:

```
show adsl linedata <slot-port>
```

This command displays a ADSL port's line bit allocation.

Discrete Multi-Tone (DMT) modulation divides up a line's bandwidth into tones. This command displays the number of bits transmitted for each tone. This can be used to determine the quality of the connection, whether a given sub-carrier loop has sufficient margins to support ADSL transmission rates, and possibly to determine whether certain specific types of interference or line attenuation exist. Refer to the ITU-T G.992.1 recommendation for more information on DMT.

The better (or shorter) the line, the higher the number of bits transmitted for a DMT tone. The maximum number of bits that can be transmitted per DMT tone is 15.

"usBit table" displays the number (in hexadecimal format) of bits transmitted per DMT tone for the upstream channel (from the subscriber's DSL modem or router to the DSL line card).

"dsBit table" displays the number (in hexadecimal format) of bits received per DMT tone for the downstream channel (from the DSL line card) to the subscriber's DSL modem or router).

"usSnr Table" displays the upstream (from the subscriber's DSL modem or router to the DSL line card) Signal to Noise Ratio. The higher the number, the better the line quality for that tone.

The bit allocation contents are only valid when the link is up.

The following example displays the line bit allocation for DSL port 5 on the line card in slot 7. In the following example, the upstream channel is carried on tones 8 to 17 and the downstream channel is carried on tones 34 to 497 (space is left between the channels to avoid interference).

```
ras> show adsl linedata 7-5
slot-port=7-5, DSL line data
link      = link_up
savedData=true
    usBit Table
  1:00 00 00 00 00 00 00 07 08 09 0a 0b 0b 0c 0c 0d
 17:0d 0d 0d 0e 0d 0d 0d 0d 0d 0d 0d 0c 0b 0a 09 08
 33:00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
 49:00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
    dsBit Table
  1:00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
 17:00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
 33:00 09 0a 0a 0a 0b 0b 0b 0b 0c 0c 0c 0c 0c 0d 0d
 49:0d 0d 0d 0d 0d 0e 0e 0e 0e 0e 0e 0e 0e 0e 0e 0e
 65:00 0e 0e 0e 0e 0e 0e 0e 0e 0e 0e 0e 0e 0e 0e 0e
 81:0e 0e 0e 0e 0e 0e 0e 0e 0e 0e 0e 0e 0e 0e 0e 0e
 97:0e 0e 0e 0e 0e 0e 0e 0e 0e 0e 0e 0e 0e 0e 0e 0e
113:0e 0e 0e 0e 0e 0e 0e 0e 0e 0e 0e 0e 0e 0e 0e 0e
129:0e 0e 0e 0e 0e 0e 0e 0e 0e 0e 0e 0e 0e 0e 0e 0e
145:0e 0e 0e 0e 0e 0e 0e 0e 0e 0e 0e 0e 0e 0e 0e 0e
161:0e 0e 0e 0e 0e 0e 0e 0e 0e 0e 0e 0e 0e 0e 0e 0e
177:0e 0e 0e 0e 0e 0e 0e 0e 0e 0e 0e 0e 0e 0e 0e 0e
193:0e 0e 0e 0e 0e 0e 0e 0e 0e 0e 0e 0e 0e 0e 0e 0e
209:0e 0e 0e 0e 0e 0e 0e 0e 0e 0e 0e 0e 0e 0e 0e 0e
225:0e 0e 0e 0e 0e 0e 0e 0e 0e 0e 0e 0e 0e 0e 0e 0e
241:0e 0e 0e 0e 0e 0e 0e 0e 0e 0e 0e 0e 0e 0e 0e 0e
257:0e 0e 0e 0e 0e 0e 0e 0e 0e 0e 0e 0e 0e 0e 0e 0e
273:0e 0e 0e 0e 0d 0e 0e 0e 0e 0e 0e 0e 0e 0d 0d 0e
289:0e 0d 0d 0e 0d 0e 0e 0e 0e 0e 0e 0d 0d 0e 0d 0e
305:0e 0e 0e 0d 0d 0e 0e 0d 0e 0d 0d 0e 0e 0e 0e 0e
321:0e 0d 0d 0d 0d 0d 0e 0d 0e 0e 0d 0d 0e 0d 0e 0d
337:0e 0d 0d 0d 0d 0e 0e 0d 0d 0d 0d 0d 0d 0d 0d 0d
353:0d 0d 0d 0d 0d 0d 0d 0d 0d 0c 0c 0c 0c 0b 0a 09
369:08 08 09 0a 0b 0c 0c 0c 0d 0d 0d 0d 0d 0d 0d 0d
385:0d 0d 0d 0d 0d 0d 0d 0d 0d 0d 0d 0d 0d 0d 0d 0d
401:0d 0d 0d 0d 0d 0d 0d 0d 0d 0d 0d 0d 0d 0d 0d 0d
417:0d 0d 0d 0d 0d 0d 0d 0d 0d 0d 0d 0d 0d 0d 0d 0d
433:0d 0d 0d 0d 0d 0d 0d 0d 0d 0d 0d 0d 0d 0d 0d 0d
449:0d 0d 0d 0d 0d 0d 0d 0d 0d 0d 0d 0d 0d 0d 0c 0d
465:0d 0c 0d 0c 0c 0c 0c 0c 0c 0c 0c 0c 0c 0c 0c 0c
481:0c 0c 0c 0c 0c 0c 0c 0c 0c 0c 0c 0c 0c 0c 0c 0c
497:0c 0c 0c 0c 0c 0b 0b 0b 0b 0b 0a 0a 09 08 08 05
    usSnr Table(dB)
 1~ 8:     0.00     0.00     0.00     0.00     0.00     0.00     0.00    40.96
 9~16:    46.37    48.65    51.67    54.03    53.81    57.19    56.49    59.87
17~24:    59.91    59.85    59.22    61.98    59.94    59.87    59.23    58.33
25~32:    57.80    57.39    57.39    55.57    52.70    49.45    45.75    43.45
33~40:     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
41~48:     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
49~56:     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
57~64:     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
```

29.3.1.2 show adsl linegain Command

Syntax:

```
show adsl linegain <slot-port>
```

This command displays the gain parameter of the active ADSL line.

29.3.1.3 show adsl linehlog Command

Syntax:

```
show adsl linehlog <slot-port>
```

This command displays the HLOG parameter of the active ADSL line.

29.3.1.4 show adsl lineqln Command

Syntax:

```
show adsl lineqln <slot-port>
```

This command displays the QLN parameter of the active ADSL line.

29.3.1.5 show adsl linetssi Command

Syntax:

```
show adsl linetssi <slot-port>
```

This command displays the TSSI parameter of the active ADSL line.

29.3.2 show arp Command

Syntax:

```
show arp
```

This command displays the MSC1000G's IP Address Resolution Protocol table. This is the list of IP addresses and matching MAC addresses that the MSC1000G has resolved.

An example is shown next.

```
ras> show arp
ip address       time ether address     interface
---------------- ----- ----------------- ----------
172.23.14.26      290 00:0d:60:cc:14:e9 outband
172.23.14.76      290 00:00:e8:97:70:64 outband
172.23.14.91      290 00:0a:e4:0a:76:21 outband
172.23.14.98      290 00:50:70:ff:f3:89 outband
172.23.15.97      300 08:00:46:74:0e:a5 outband
172.23.15.172     300 02:0e:a6:89:41:60 outband
172.23.15.254     300 00:04:80:9b:78:00 outband
arp entry: 7
```

29.3.3 show atm Command

Syntax:

```
show atm <slot-port>|<slot-port-vpi/vci> [reset]
```

This command displays ATM traffic counters. It can also reset the counters.

The following example displays the ATM traffic counters for DSL port 5 on the line card in slot 7.

```
ras> show atm 7-5
port 7-5
                        since pvc create     since last reset
                      -------------------- --------------------
rx cells            :                    0                    0
tx cells            :                    0                    0
rx rate     (byte/s):                    0                    0
tx rate     (byte/s):                    0                    0
crc errors          :                    0                    0
```

The following table describes labels in this example.

Table 174 show atm Command Display

LABEL	DESCRIPTION
rx cells	This field shows the number of ATM cells received on this port.
tx cells	This field shows the number of ATM cells transmitted on this port.
rx rate	This field shows the number of kilobytes per second received on this port.
tx rate	This field shows the number of kilobytes per second transmitted on this port.
crc errors	This field shows the number of Cyclic Redundancy Check errors on this port.
since pvc create	This column displays the ATM traffic statistics that have accumulated from when the PVC was created (either via command or the building of the DSL link).
since last reset	This column displays the ATM traffic statistics that have accumulated from the most recent time that the counters were reset.

29.3.4 show dot3ad Command

Syntax:

```
show dot3ad
```

This command displays the (IEEE 802.3ad) link aggregation settings.

The following is an example.

```
ras> show dot3ad
[aggregator info]
 tsub:
    state  : disable
    members: sub1 sub2
    links  :
    syncs  :
 tup:
    state  : disable
    members: up1 up2
    links  :
    syncs  :
```

29.3.5 show dhcp counter Command

Syntax:

```
show dhcp counter <slot>|<slot-port>
```

This command displays the number of DHCP related packets received on the port. The following displays an example (refer to Table 85 on page 229 for field descriptions).

```
ras> show dhcp counter 2-2
card name: <NULL>
 port discover  offer   request    ack    overflow
----- -------- -------- -------- -------- --------
 2- 2        1        2        1        1        0
ras>
```

29.3.6 show dhcp snoop Command

Syntax:

```
show dhcp snoop <slot-port>
```

This command displays the DHCP snooping table on port 2 of the line card in slot 2 (refer to Table 85 on page 229 for field descriptions).

```
ras> show dhcp snoop 2-2
port 2-2: overflow 0
 idx       ip               mac         vid
 --- --------------- ----------------- ------
   1     172.23.19.4 00:50:ba:2c:70:e1  1
ras>
```

29.3.7 show enet Command

Syntax:

```
show enet <sub1|sub2|up1|up2>|<slot>
```

This command displays Ethernet packet counters for the specified Ethernet interface or DSL line card.

The following example displays the Ethernet packet counters for the Ethernet connection to the line card in slot 1.

```
ras> show enet up1
slot 1:
  link status: up        rate: 1000Mbps        up time:    6:08:07:50
  data rate (Tx/Rx): 0/0 kbps  utilization (Tx/Rx): 0/0
                             Rx                  Tx
                  ------------------- --------------------
  Bytes           :           357823090            115120466
  Pkts            :              969653              1480867
  UcastPkts       :              969652               975144
  NUcastPkts      :                   1               505723
  McastPkts       :                   0                    0
  BcastPkts       :                   1               505723
  Pause           :                   0                    0
  Pkt64           :                   0
  Pkt65~127       :             2146102
  Pkt128~255      :               68655
  Pkt256~511      :               14110
  Pkt512~1023     :               19605
  Pkt1024~1518    :              202045

    Press any key to continue, 'e' to exit
                             Rx                  Tx
                  ------------------- --------------------
  OverSizPkt      :                   0
  UndSizPkt       :                   0
  FCSErr          :                   0
  AlignErr        :                   0
  Jabber          :                   0
  Fragment        :                   0
  Dropped         :                   0
  Underrun        :                                       0
  ExCollisn       :                                       0
```

The following table describes labels in this example.

Table 175 show enet Command Display

LABEL	DESCRIPTION
link status	This shows whether or not the port has an active connection.
rate	This shows the connection speed for an active connection.
up time	This shows how long the connection has been active.
data rate (Tx/Rx)	This shows at what rate the port is currently sending or receiving data.
utilization (Tx/Rx): 0/0	This shows what percent the port's current data rate is out of the connection's maximum rate.
Bytes	This is the number of octets of Ethernet frames received/transmitted that are from 0 to 1518 octets in size, counting the ones in bad packets, not counting framing bits but counting FCS (Frame Check Sequence) octets. An octet is an 8-bit binary digit (byte).
Pkts	This is the number of packets received/transmitted on this port (including multicast, unicast, broadcast and bad packets).

Table 175 show enet Command Display (continued)

LABEL	DESCRIPTION
UcastPkts	This is the number of good unicast frames received/transmitted.
NUcastPkts	This is the number of good non-unicast frames received/transmitted.
MCastPkts	This is the number of good multicast frames received/transmitted of 64 to 1518 octets in length (for non VLAN) or 1522 octets (for VLAN), not including Broadcast frames. Frames with range or length errors are also not taken into account.
BCastPkts	This is the number of good broadcast frames received/transmitted of 64 to 1518 octets in length (for non VLAN) or 1522 octets (for VLAN), not including multicast frames. Frames with range or length errors are also not taken into account.
Pause	This is the number of valid IEEE 802.3x Pause frames received/transmitted on this port.
Pkt64	This is the number of frames received/transmitted (including bad frames) that were 64 octets or less in length (this includes FCS octets but excludes framing bits).
Pkt65~127	This is the number of frames received/transmitted (including bad frames) that were 65 to 127 octets in length (this includes FCS octets but excludes framing bits).
Pkt128~255	This is the number of frames received and transmitted (including bad frames) that were 128 to 255 octets in length (this includes FCS octets but excludes framing bits).
Pkt256~511	This is the number of frames received/transmitted (including bad frames) that were 256 to 511 octets in length (this includes FCS octets but excludes framing bits).
Pkt512~1023	This is the number of frames received/transmitted (including bad frames) that were 512 to 1023 octets in length (this includes FCS octets but excludes framing bits).
Pkt1024~1518	This is the number of frames received/transmitted (including bad frames) that were 1024 to 1518 octets in length (this includes FCS octets but excludes framing bits).
OverSizPkt	This is the number of frames received/transmitted that were bigger than 1518 (non VLAN) or 1522 (VLAN) octets and contained a valid FCS.
UndSizPkt	This is the number of frames received/transmitted that were less than 64 octets long and contained a valid FCS.
FCSErr	This is the number of frames received/transmitted with an integral length of 64 to 1518 octets and containing a Frame Check Sequence error.
AlignErr	This is the number of frames received/transmitted that were 64 to 1518 (non VLAN) or 1522 (VLAN) octets long but contained an invalid FCS and a non-integral number of octets.
Jabber	This is the number of frames received/transmitted that were longer than 1518 octets (non VLAN) or 1522 octets (VLAN) and contained an invalid FCS, including alignment errors.
Fragment	This is the number of frames received/transmitted that were less than 64 octets long, and contained an invalid FCS, including non-integral and integral lengths.
Dropped	This is the number of received/transmitted frames that were received by the MSC1000G, but later dropped because of a lack of system resources.
Underrun	This is the number of outgoing frames that were less than 64 octets long.
ExCollisn	This is the number of frames for which transmission failed due to excessive collisions. Excessive collision is defined as the number of maximum collisions before the retransmission count is reset.

29.3.8 show igmp Commands

Use the show igmp commands to display current IGMP settings and statistics. Use `multicast igmp enable` to enable IGMP first.

29.3.8.1 show igmp info Command

Syntax:

```
show igmp info
```

This command displays the current IGMP settings and the number of IGMP-related packets received. The following figure shows an example.

```
ras> show igmp info
mode is igmpsnooping
number of queries  = 0
number of reports  = 0
number of leaves   = 0
number of unknowns = 0
number of groups   = 0
ras>
```

29.3.8.2 show igmp group Command

Syntax:

```
show igmp group [<vid> <mcast_ip>]
```

where

`<mcast_ip>` = The multicast IP address.

This command displays the IGMP group information that is learned on the system or from the specified VLAN.

```
ras> show igmp group
[multicast group info]
vid  multicast group port                slot             timestamp
---- --------------- -------------------- ---------------- --------------
ras>
```

29.3.8.3 show igmp port info Command

Syntax:

```
show igmp port info <slot-port>
```

This command displays the current IGMP settings and the number of IGMP-related packets received. The following figure shows the IGMP packet counters for port 1 on the line card in slot 3.

```
ras> show igmp port info 3-1
 port group_cnt query_cnt  join_cnt leave_cnt
----- --------- --------- --------- ---------
 3- 1         0         0         0         0
ras>
```

29.3.8.4 show igmp port group Command

Syntax:

```
show igmp port group <slot-port>
```

This command displays the IGMP groups a port joins. The following figure shows an example for port 1 on the line card in slot 3.

```
ras> show igmp port group 3-1
 port  vid       mcast_ip         client ip
----- ------ ---------------- ----------------
ras>
```

29.3.9 show ip Command

Syntax:

```
show ip
```

This command displays the management IP settings and statistics. An example is shown next.

```
ras> show ip
               outband[enif0]   inband[swif0]
-------------- --------------- ---------------
inet          :    192.168.0.1   172.23.19.206
netmask       :  255.255.255.0   255.255.255.0
broadcast     :  192.168.0.255   172.23.19.255
mtu           :           1500            1500
vid           :              -               1
in octet      :              0        11201874
in unicast    :              0           26230
in multicast  :              0            3676
in discard    :              0             749
in error      :              0               0
in unknown    :              0             749
out octet     :              0          265141
out unicast   :              0            1646
out multicast :              0               0
out discard   :              0               0
out error     :              0               0

ras>
```

29.3.10 show ipbpvc arpproxy Command

Syntax:

```
show ipbpvc arpproxy < all | domain [<domain-name>] | edgerouter [<ip> <vid>]
| interface [<ip/mask> <vid>]
```

where

<domain-name>	=	The name of the domain.
<ip>	=	IP address, in dotted decimal notation.
<mask>	=	Number of bits <1..32> in the subnet mask.
<vid>	=	The ID (<1..4094>) of the VLAN.

This command displays the specified learned ARP table entries.

An example is shown below.

```
ras> show ipbpvc arpproxy show
Domain Name: d01
ip              mac               port vpi   vci interface           vid type
--------------- ----------------- ---- --- ----- ------------------ ---- ---
192.168.2.2     00:05:5d:03:99:3a   22   0    33 192.168.2.0/24        3   D
192.168.2.254   00:13:49:95:03:07   50   -     - 192.168.2.254         2   U
*: the ARP is learned from DHCP and can't be flushed.
```

The following table describes the labels in this screen.

Table 176 IPB ARP Proxy Show Command Output

LABEL	DESCRIPTION
Domain Name	This field displays the name of the domain which has this ARP table.
ip	This field displays the IP address assigned to the specific device.
mac	This field displays the MAC (Media Access Control) address of the device.
port	This field displays the port number to which the device is connected.
vpi/vci	This field displays the Virtual Path Identifier (VPI) and Virtual Circuit Identifier (VCI) the device is using. The VPI and VCI identify a channel on this port.
interface	This field displays the name of the interface the device is using.
vid	This field displays the VLAN ID the device is using.
type	This field indicates whether this entry is used for upstream traffic (**U**, or uplink interface) or downstream traffic (**D**, or downlink interface). By default, all entries are for downstream traffic, unless the edge router is configured using the edge router commands (see Section 27.12 on page 441).

29.3.11 show ipbpvc interface Command

Syntax:

```
show ipbpvc interface [<ip/mask>|<vid>|<ip/mask> <vid>]
```

where

<ip/mask>	=	IP address, in dotted decimal notation. Number of bits <0..32> in the subnet mask.
<vid>	=	The ID (<1..4094>) of the VLAN.

This command displays the (run-time) downlink interfaces for the selected range of IP addresses and/or VLAN. This table includes all the forwarding information for downstream traffic, whether learned by snooping DHCP packets or provided manually.

An example is shown next.

```
ras> show ipbpvc interface
ip/mask            vid  slot port vpi vci
------------------ ---- ---- ---- --- ----
192.168.3.0/24     402  -    -    -   -
```

29.3.12 show ipbpvc route Command

Syntax:

```
show ipbpvc route [<domain-name>|<ip/mask>|<domain-name> <ip/mask>]
```

where

<domain-name>	=	The name of the domain.
<ip/mask>	=	IP address, in dotted decimal notation. Number of bits <1..32> in the subnet mask.

This command displays the (run-time) routing table(s) for the selected domain or range of IP addresses. This table includes all the entries, whether added automatically by the MSC1000G or provided manually.

An example is shown next.

```
ras> show ipbpvc route
domain                          ip/mask            nexthop         mtrc pr type
------------------------------- ------------------ --------------- ---- -- -
--
ISP1                             0.0.0.0/0          172.23.19.254   15   0  U
ISP1                             172.23.19.249/32   -               -    -  U
ISP1                             172.23.19.254/32   -               -    -  U
ISP1                             192.169.1.0/24     172.23.19.249   5    0  U
example                          192.168.1.200/32   -               -    -  U
```

The `type` field indicates whether this entry is used for upstream traffic (**U**, or uplink interface) or downstream traffic (**D**, or downlink interface). By default, all entries are for downstream traffic, unless the **Edge Router IP** is configured in the edge router commands (see Section 27.12 on page 441).

The other output values correspond to the input values of other IP bridge routing table commands.

29.3.13 show lineinfo Command

Syntax:

```
show lineinfo <slot-port>
```

This command shows the line operating values of an ADSL port.

The following example displays the line operating values for ADSL port 5 on the line card in slot 7.

```
ras> show lineinfo 1-1
slot-port=1-1, DSL line info
link                 = link_up
service type         = adsl2plus_mode
coding mode          = Concatenated (trellis and RS) coding
us interleave delay = 18 ms
ds interleave delay = 6 ms
us inp               = 2.1 DMT symbol(s)
ds inp               = 0.5 DMT symbol(s)
us output power      = 9.6 dBm
ds output power      = 13.7 dBm
country code         = 0000
provider code        = 5443544e("TCTN")
```

The following table describes labels in this example.

Table 177 show lineinfo Command Display

LABEL	DESCRIPTION
link	This displays the connection status of the DSL link.
service type	This is the ADSL standard that the port is using.
coding mode	Trellis coding helps to reduce the noise in ADSL transmissions. Trellis may reduce throughput but it makes the connection more stable. “RS” coding stands for Reed-Solomon error correction.
us interleave delay	This is the numbers of milliseconds of interleave delay for upstream transmissions.
ds interleave delay	This is the numbers of milliseconds of interleave delay for downstream transmissions.
us inp	This is the number of impulse noise protection DMT symbols for upstream transmissions.
ds inp	This is the number of impulse noise protection DMT symbols for downstream transmissions.
us output power	This is the power output of the subscriber’s DSL modem or router. The total output power of the transceiver varies with the line length and quality.
ds output power	This is the DSP port’s output power. The total output power of the transceiver varies with the length and line quality. The farther away the subscriber’s ADSL modem or router is or the more interference there is on the line, the higher the power will be.
country code	This is the country code acquired from the subscriber’s ADSL device during negotiation/provisioning message interchanges. The country code is from the Vendor ID (see ITU-T G.994.1).
provider code	This is the provider code acquired from the subscriber’s ADSL device during negotiation/provisioning message interchanges. The provider code includes the Vendor ID and Version Number obtained from the Vendor ID.

29.3.14 show lineperf Command

Syntax:

```
show lineperf <slot-port>
```

This command shows the line performance counters of an ADSL port.

The following example displays the line performance counters for ADSL port 5 on the line card in slot 7.

```
ras> show lineperf 7-5
slot-port=7-5, DSL line perf
          fast       interleave
          ---------- ----------
  FeCrc =          0          0
  NeCrc =          0          7
  FeFec =          0       3675
  NeFec =          0          1
          upstream   downstream
          ---------- ----------
  Es    =          3          2
  Ses   =          2          1
  Uas   =          0          0
  Lofs  =          0          1
  Loss  =          1          1
  Lprs  =          0          0
ras>
```

These counters display line performance data that has been accumulated since the system started. The definitions of near end/far end are relative to the ATU-C (ADSL Termination Unit-Central Office). Downstream refers to data from the ATU-C and upstream refers to data from the ATU-R. “interleave” stands for interleaved and “fast” stands for non-interleaved (fast mode).

A block is a set of consecutive bits associated with the path; each bit belongs to one and only one block. Consecutive bits may not be contiguous in time.

Table 178 Line Performance Counters

LABEL	DESCRIPTION
FeCrc	Far End Cyclic Redundancy Checks.
NeCrc	Near End Cyclic Redundancy Checks.
FeFec	The Far End Corrected blocks.
NeFec	The Near End Corrected blocks.
Es	The number of Errored Seconds. This is how many seconds contained at least one errored block or at least one defect.
Ses	The number of Severely Errored Seconds. This is how many seconds contained 30% or more errored blocks or at least one defect. This is a subset of Es.
Uas	The number of Unavailable Seconds.
Lofs	The number of Loss Of Frame Seconds.
Loss	The number of Loss Of Signal Seconds.
Lprs	The number of times a Loss of PoweR (on the ATUR) has occurred.

29.3.15 show linerate Command

Syntax:

```
show linerate <slot-port>
```

This command displays an ADSL port's line rate information.

The following example displays the line operating values for ADSL port 5 on the line card in slot 7.

```
ras> show linerate 7-5
slot-port=7-5, DSL line rate
link                  = link_up
                        upstream   downstream
                        ---------- ----------
payload rate    (kbps)=        999      23995
actual rate     (kbps)=       1008      24004
attainable rate(kbps)=       1013      24634
noise margin      (dB)=       18.8       12.5
attenuation       (dB)=        0.8        0.0
```

The following table describes labels in this example.

Table 179 Line Rate Information

LABEL	DESCRIPTION
The rate fields display the transmission rates. “Line Down” indicates that the ADSL port is not connected to a subscriber.	
up/down stream	Upstream refers to traffic coming into the DSL line card from the subscriber's ADSL modem or router. Downstream refers to traffic going out from the DSL line card to the subscriber's ADSL modem or router.
payload rate	These are the data (the payload data without transport layer protocol headers and traffic) transfer rates (in Kbps) at which the port is receiving and sending data.
actual rate	These are the data transfer rates (in Kbps) at which the port is receiving and sending data.
attainable rate	These are the highest theoretically possible transfer rates (in Kbps) at which the port could receive and send data.
noise margin	These are the DSL line’s noise margins. Measured in decibels (dB).
attenuation	These are the reductions in amplitude of the DSL signals. Measured in decibels (dB).

29.3.16 show linestat Command

Syntax:

```
show linestat <slot-port>
```

This command displays an ADSL port's link status.

The following example displays the link status for ADSL port 5 on the line card in slot 7.

```
ras> show linestat 7-5
                 usPayLoadRate dsPayLoadRate
port link            (kpbs)        (kpbs)    protocol       up time
---- ----------- ------------- ------------- -------------- --------------
   5 up                    999         23995 adsl2plus             4h58m
```

29.3.17 show mac Command

Syntax:

```
show mac [sub1|sub2|up1|up2|enet|<mac>|<slot>|<slot-port>|{vid <vid1>[-
<vid2>]
```

This command displays the IEEE 802.1d MAC address forwarding table. The following example displays the IEEE 802.1d MAC address forwarding table on uplink port 1.

```
ras> show mac up1
total count: 41
vid  mac               port
---- ----------------- -----
   1 00:00:04:a0:00:31 enet6
   1 00:00:e2:82:7d:90 enet6
   1 00:02:44:84:02:4d enet6
   1 00:04:80:9b:78:00 enet6
   1 00:05:5d:8d:e0:52 enet6
   1 00:07:40:ca:35:a8 enet6
   1 00:0d:68:72:20:06 enet6
   1 00:0f:fe:25:a1:9e enet6
```

29.3.18 show monitor Command

Syntax:

```
show monitor <slot>
```

This command displays a card's hardware monitor statistics.

The following example displays the hardware monitor statistics for the line card in slot 7.

```
ras> show monitor 7
'*' indicates a current alarm
voltage:
idx  volt             current  nominal  high_lmt low_lmt
---  ---------------- -------- -------- -------- --------
  1   1.2V               1.187    1.200    1.284    1.116
  2 * 1.8V               1.976    1.800    1.926    1.674
  3   3.3V               3.263    3.300    3.531    3.069
  4  20.5V              20.596   20.500   22.550   18.450
temperature:
idx  temperature      current  high_lmt low_lmt
---  ---------------- -------- -------- --------
  1  Temp1              58.000   95.000  -50.000
  2  Temp2              54.000   90.000  -50.000
  3  Temp3              51.000   85.000  -50.000
ras>
```

This table describes labels in the example.

Table 180 show monitor Command Information

LABEL	DESCRIPTION
voltage	The power supply for each voltage has a sensor that can detect and report the voltage.
current	This is the present voltage reading.
nominal	This field displays the average voltage measured at this sensor.
high_lmt	This field displays the high voltage threshold for this sensor.
low_lmt	This field displays the low voltage threshold for this sensor.
temperature	This example displays the temperature measurements in degrees Celsius. Each temperature sensor can detect and report the temperature. Temperature sensor 1 is near the ADSL line driver. Temperature sensor 2 is near the ADSL chipset. Temperature sensor 3 is near the central processing unit.
current	This shows the current temperature at this sensor.
high_lmt	This field displays the high temperature threshold for this sensor.
low_lmt	This field displays the low temperature threshold for this sensor.

29.3.19 show mstp Command

Syntax:

```
show mstp <mstid> [<end_mstid>]
```

where

<mstid> = The first MST region ID.

<end_mstid> = The last MST region ID.

This command displays information (such as bridge ID, topology change counter, etc.) of the specified MST region(s).

The following example displays MST region information for MST IDs 1 and 2.

```
ras> show mstp 1 2
[mstid 1]
BridgeID            : 0x8001-00a0c5da46eb
TimeSinceTopoChange :    3:08:23:03
TopoChangeCount     : 0
TopoIsChanging      : false
IntRootPortID       : 0x0000
IntRootID           : 0x8001-00a0c5da46eb
IntRootPathCost     : 0


[mstid 2]
BridgeID            : 0x8002-00a0c5da46eb
TimeSinceTopoChange :    3:08:22:54
TopoChangeCount     : 0
TopoIsChanging      : false
IntRootPortID       : 0x0000
IntRootID           : 0x8002-00a0c5da46eb
IntRootPathCost     : 0


ras>
```

29.3.20 show packet Command

Syntax:

```
show packet <slot-port>
```

This command displays a port's packet counter.

The following example displays the hardware monitor statistics for ADSL port 5 on the line card in slot 7.

```
ras> show packet 7-5
ifInOctets        = 66240
ifInUcastPkts     = 1029
ifInMcastPkts     = 149
ifInBcastPkts     = 202
ifInNUcastPkts    = 351
ifInDiscards      = 86
ifInErrors        = 0
ifInUnknownProtos = 0
ifOutOctets       = 2706192
ifOutUcastPkts    = 333
ifOutMcastPkts    = 55844
ifOutBcastPkts    = 111055
ifOutNUcastPkts   = 166899
ifOutDiscards     = 0
ifOutErrors       = 0
ras>
```

29.3.21 show paepvc counter Command

Syntax:

```
show paepvc counter <slot-port>|<slot-port-vpi/vci>
```

This command displays the PAE PVC statistics. The following example displays all PAE PVC counters for port 1 on the line card in slot 2.

```
ras> show paepvc counter 2-1
pvc 2-1-1/33
                                tx               rx
                          ---------------- ----------------
 ppp lcp config-request :                -                0
 ppp lcp echo-request   :                -                0
 ppp lcp echo-reply     :                -                0
 pppoe padi             :                0                -
 pppoe pado             :                -                0
 pppoe padr             :                0                -
 pppoe pads             :                -                0
 pppoe padt             :                0                0
 pppoe srvcname error   :                -                0
 pppoe acname error     :                -                0
 pppoe generic error    :                0                0

    Press any key to continue, 'e' to exit
ras>
```

The following table describes the counters.

Table 181 show paepvc counter Command Fields

FIELD	DESCRIPTION
ppp lcp config-request	This field displays the number of PPP config-request packets received.
ppp lcp echo-request	This field displays the number of PPP echo-request packets received.
ppp lcp echo-reply	This field displays the number of PPP echo-reply packets received.
pppoe padi	This field displays the number of PPPoE Active Discovery Initialization (PADI) packets transmitted.
pppoe pado	This field displays the number of PPPoE Active Discovery Offer (PADO) packets received.
pppoe padr	This field displays the number of PPPoE Active Discovery Request (PADR) packets transmitted.
pppoe pads	This field displays the number of PPPoE Active Discovery Session-Confirmation (PADS) packets received.
pppoe padt	This field displays the number of PPPoE Active Discovery Termination (PADT) packets received/transmitted.
pppoe srvcname error	This field displays the number of errors received for which the service-name request failed.
pppoe acname error	This field displays the number of errors received when the access concentrator experienced an error performing the host request.
pppoe generic error	This field displays the number of unrecoverable errors occurred.

29.3.22 show paepvc session Command

Syntax:

```
show paepvc session <slot-port>|<slot-port-vpi/vci>
```

This command displays the PAE PVC session status. The following example displays the session status of all PAE PVC(s) on port 1 of the line card in slot 2.

```
ras> show paepvc session 2-1
pvc 2-1-1/33
session state : down
session id    : 0
session uptime: 0 secs
acname        :
srvcname      :

ras>
```

29.3.23 show performance Command

Syntax:

```
show performance <slot-port> curr|15min|1day
```

This command displays a DSL port's performance counters.

The following example displays the current performance counters for ADSL port 5 on the line card in slot 7.

```
ras> show perform 7-5 curr

PhysEntry
---------
atuc/atur CurrSnrMgn         = 12.5/5.5 dB
atuc/atur CurrAtn            = 1.9/0.0 dB
atuc/atur CurrOutputPwr      = 13.3/12.3 dBm
atuc/atur CurrAttainableRate = 24989/1013 kbps

ChanEntry
---------
atuc/atur ChanInterleaveDelay = 5/14 ms
atuc/atur ChanCurrTxRate      = 22912/999 kbps
atuc/atur ChanPrevTxRate      = 22912/999 kbps

PerfDataEntry
-------------
atuc/atur PerfLofs            = 3/0
atuc/atur PerfLoss            = 3/0
atuc      PerfLols            = 3
atur      PerfLprs            = 0
atuc/atur PerfESs             = 0/1 seconds
atuc      PerfInits           = 4
atuc/atur PerfStatSesL        = 0/1 seconds
atuc/atur PerfStatUasL        = 0/131 seconds
ras>
```

This table describes the fields.

“atuc” statistics are for the downstream connection (or traffic). This is the connection going from the IES-5000 to the subscriber’s device.

“atur” statistics are for the upstream connection (or traffic). This is the connection coming from the subscriber’s device to the IES-5000.

Table 182 show performance curr

LABEL	DESCRIPTION
CurrSnrMgn	These are the ADSL line’s current downstream and upstream signal to noise margins in decibels.
CurrAtn	These are the ADSL line’s current downstream and upstream line attenuation in decibels.
CurrOutputPwr	These are the ADSL line’s current downstream and upstream output powers in decibels.
CurrAttainableRate	These are the ADSL line’s current downstream and upstream attainable rates in decibels.
ChanInterleaveDelay	These are the numbers of milliseconds of interleave delay for downstream and upstream transmissions.
ChanCurrTxRate	These are the ADSL line’s current downstream and upstream transmission rates in decibels.
ChanPrevTxRate	These are the ADSL line’s previous downstream and upstream transmission rates in decibels.
PerfLofs	These are the ADSL line’s downstream and upstream numbers of Loss of frame Seconds that have occurred within the current 15 minute period.
PerfLoss	These are the ADSL line’s downstream and upstream numbers of Loss of signal Seconds that have occurred within the current 15 minute period.
PerfLols	These are the ADSL line’s downstream and upstream numbers of Loss of link Seconds that have occurred within the current 15 minute period.
PerfLprs	These are the ADSL line’s downstream and upstream numbers of Loss of power Seconds that have occurred within the current 15 minute period.
PerfESs	These are the ADSL line’s downstream and upstream numbers of Errored Seconds that have occurred within the current 15 minute period.
PerfInits	These are the ADSL line’s downstream and upstream numbers of initialization failure traps that have occurred within the current 15 minute period.
PerfStatSesL	These are the ADSL line’s downstream and upstream numbers of Severely errored seconds that have occurred within the current 15 minute period.
PerfStatUasL	These are the ADSL line’s downstream and upstream numbers of UnAvailable Seconds that have occurred within the current 15 minute period.

The following example displays the one day performance counters for ADSL port 5 on the line card in slot 7.

```
ras> show performance 7-5 1day
PerfCurr1Day
-------------
atuc/atur TimeElapsed         = 57163/57163 seconds
atuc/atur Lofs                = 0/0 seconds
atuc/atur Loss                = 0/0 seconds
atuc      Lols                = 0 seconds
atuc      Lol                 = 0
atur      Lprs                = 0 seconds
atur      Lpr                 = 0
atuc/atur ESs                 = 0/0 seconds
atuc      Inits               = 1
atuc/atur SesL                = 0/0 seconds
atuc/atur UasL                = 0/0 seconds

ChanPerfCurr1Day
-----------------
atuc/atur TimeElapsed         = 57163/57163 seconds

    Press any key to continue, 'e' to exit
PerfPrev1Day
------------
atuc/atur MoniSecs            = 0/0 seconds
atuc/atur Lofs                = 0/0 seconds
atuc/atur Loss                = 0/0 seconds
atuc      Lols                = 0 seconds
atuc      Lol                 = 0
atur      Lprs                = 0 seconds
atur      Lpr                 = 0
atuc/atur ESs                 = 0/0 seconds
atuc      Inits               = 0
atuc/atur SesL                = 0/0 seconds
atuc/atur UasL                = 0/0 seconds
ChanPerfPrev1Day
----------------
atuc/atur MoniSecs            = 0/0 seconds
ras>
```

This table describes the fields that have not already been addressed.

Table 183 show performance 1day

LABEL	DESCRIPTION
TimeElapsed	This is the number of seconds that the DSL line card has been active.
MoniSecs	This is the number of seconds that the DSL line card was active during the measured period.

29.3.24 show rmon Command

Syntax:

```
show rmon stats|history <giga-port>
```

This command displays subtending or uplink RMON MIB information. See RFC 1757 for information on the RMON MIBs.

The following example displays RMON history information for the Gigabit Ethernet uplink 1 interface.

```
ras> show rmon history up1
  historyControlInterval = 30 seconds
  Index          SampleIndex    IntervalStart  DropEvents     Octets
  Pkts           BroadcastPkts  MulticastPkts  CRCAlignErrors UndersizePkts
  OversizePkts   Fragments      Jabbers        Collisions     Utilization
  -------------- -------------- -------------- -------------- --------------
               1            227           6857              0              0
               0              0              0              0              0
               0              0              0              0              0

               1            226           6827              0              0
               0              0              0              0              0
               0              0              0              0              0

               1            225           6797              0              0
               0              0              0              0              0
               0              0              0              0              0

               1            224           6767              0              0
               0              0              0              0              0
               0              0              0              0              0

               1            223           6737              0              0
               0              0              0              0              0
               0              0              0              0              0
```

The following example displays RMON statistics for the Gigabit Ethernet uplink 1 interface.

```
ras> show rmon stats up1
  etherStatsDropEvents           = 0
  etherStatsOctets               = 0
  etherStatsPkts                 = 0
  etherStatsBroadcastPkts        = 0
  etherStatsMulticastPkts        = 0
  etherStatsCRCAlignErrors       = 0
  etherStatsUndersizePkts        = 0
  etherStatsOversizePkts         = 0
  etherStatsFragments            = 0
  etherStatsJabbers              = 0
  etherStatsCollisions           = 0
  etherStatsPkts64Octets         = 0
  etherStatsPkts65to127Octets    = 0
  etherStatsPkts128to255Octets   = 0
  etherStatsPkts256to511Octets   = 0
  etherStatsPkts512to1023Octets  = 0
  etherStatsPkts1024to1518Octets = 0
```

29.3.25 show sys Command

Syntax:

```
show sys
```

This command displays the system CPU utilization for the last 60 seconds and memory usage status. The following figure shows an example.

```
ras> show sys
CPU usage status:
  baseline 1456794 ticks
 sec   ticks   util  sec   ticks   util  sec   ticks   util  sec  ticks   util
   0 1356594   6.87    1 1363056   6.43    2 1337785   8.16    3 1340022   8.01
   4 1187472  18.48    5 1366325   6.21    6 1377483   5.44    7 1153896  20.79
   8 1321237   9.30    9 1361335   6.55   10 1367923   6.10   11 1365289   6.28
  12 1354417   7.02   13 1315779   9.68   14 1366581   6.19   15 1373105   5.74
  16 1306692  10.30   17 1364969   6.30   18 1370533   5.92   19 1301424  10.66
  20 1367778   6.11   21 1378912   5.34   22 1363950   6.37   23 1360289   6.62
  24 1306006  10.35   25 1246119  14.46   26 1364775   6.31   27 1372262   5.80
  28 1359724   6.66   29 1304459  10.45   30 1377936   5.41   31 1367812   6.10
  32 1359435   6.68   33 1356803   6.86   34 1141058  21.67   35 1358068   6.77
  36 1371992   5.82   37 1188738  18.40   38 1355139   6.97   39 1326071   8.97
  40 1362797   6.45   41 1353548   7.08   42 1340872   7.95   43 1329488   8.73
  44 1313818   9.81   45 1380668   5.22   46 1294721  11.12   47 1358091   6.77
  48 1350648   7.28   49 1315303   9.71   50 1358785   6.72   51 1356484   6.88
  52 1347292   7.51   53 1325328   9.02   54 1327612   8.86   55 1245649  14.49
  56 1364073   6.36   57 1370602   5.91   58 1336428   8.26   59 1330460   8.67
  60 1377002   5.47   61 1369616   5.98   62 1355618   6.94

    Press any key to continue, 'e' to exit
Memory usage status:
------Heap status------
heap size: 42115743 bytes
Heap usage: 31954492 bytes
Heap max. available block size: 10128472
mem alloc count: 226, mem free count: 0
```

29.3.26 show user Command

Syntax:

```
show user
```

This command displays information on logged in administrators. This information includes the type of session, user name, user's IP address and what time the management session started.

The following example shows one logged in user.

```
ras> show user
[session info ('*' denotes your session)]
session    user             remote ip       login time
---------- ---------------- --------------- -------------------
*telnet    admin            172.23.19.11    13:04:46 2005/06/01
```

29.3.27 show vlan Command

Syntax:

```
show vlan [<vid>]

or

show vlan <start-vid> <end-vid>
```

This command displays the current VLANs.

The following example shows VLAN 1. It is set to send untagged Ethernet frames to the Gigabit Ethernet interfaces.

```
ras> show vlan
  vid sub1  sub2  up1   up2
---- ----- ----- ----- -----
   1   U     U     U     U
   3   -     -     -     -
   5   -     -     -     -
 101   -     -     -     -
4094   T     T     T     T
```

30

switch Commands

This chapter shows you how to use the `switch` commands.

30.1 switch Commands Overview

The `switch` commands configure switching functions and manage the Ethernet interfaces.

30.2 switch Commands Summary

The following table lists the `switch` commands. The **P** column on the right indicates the administrator privilege level needed to use the command (**H** for high, **M** for middle or **L** for low).

Table 184 switch Commands

COMMAND				DESCRIPTION	P
`switch`					
	`bandwidth`	`disable`	`<giga-port>`	Turns off bandwidth control on the specified port(s).	M
		`enable`	`<giga-port>`	Turns on bandwidth control on the specified port(s).	M
		`set`	`<giga-port> <ingress-rate> <egress-rate>`	Sets the incoming or outgoing bandwidth control for the specified port(s). 0~1000 (Mbps).	M
		`show`		Displays the bandwidth control settings.	L
	`bcastctrl`	`show`		Displays broadcast and multicast storm control settings.	L
		`threshold`	`<giga-port> <bc-limit> <mc-limit> <uu-limit>`	Sets the limitations of broadcast, multicast and unknown unicast packets, in packets per second for each trunk port (0~262143, -1 means no limit). `<bc-limit>` = broadcast packet limit `<mc-limit>` = multicast packet limit `<uu-limit>` = unknown unicast packet limit	M
	`dot3ad`	`aggport`	`<portlist> t1|t2|t3|t4|none`	Creates a link aggregation trunk groups.	M
		`disable`	`[t1|t2|t3|t4]`	Turns off link aggregation on the specified trunk group.	M

Table 184 switch Commands (continued)

COMMAND				DESCRIPTION	P
		enable	[t1|t2|t3|t4] [lacp]	Turns on link aggregation on the specified trunk group. lacp turns on LACP protocol.	M
		lacp	priority <priority>	Sets the LACP system priority (0~65535).	M
			show	Displays LACP settings.	L
			timeout short|long	Sets the time interval between exchanging LACP packets.	M
		show		Displays the link aggregation state.	L
	garptimer	join	<join-msec>	Sets the GARP timer's Join Timer in milliseconds, 100~32766.	M
		leave	<leave-msec>	Sets the GARP timer's Leave Timer in milliseconds, 201~65534.	M
		leaveall	<leaveall-msec>	Sets the GARP timer's Leave All Timer in milliseconds, 202~65535.	M
		set	<join-msec> <leave-msec> <leaveall-msec>	Sets GARP timers.	M
		show		Displays the GARP timer settings.	L
	isolation	disable		Turns off the subscriber isolation feature.	M
		enable		Turns on the subscriber isolation feature.	M
		vlan	delete <vid>	Deletes the specified isolation VLAN.	M
			set <vid>	Creates the specified isolation VLAN.	M
		show		Displays the subscriber isolation feature's current setting.	L
	mac	flush	enet|all	Clears the MAC table on the Ethernet ports or all ports (Ethernet and subscriber ports).	M
	mstp	cfgname	<config name>	Sets a descriptive name for the MSTP configuration.	M
		disable		Deactivates MSTP on the system.	M
		enable		Activates MSTP on the system.	M
		fwdelay	<fwdelay-sec>	Sets the maximum time (between 4 and 30 seconds) a switch will wait before changing states	M
		hellotime	<hellotime-sec>	Sets the time interval (between 1 and 10 seconds) between BPDU (Bridge Protocol Data Units) configuration message generations by the root switch.	M
		maxage	<maxage-sec>	Sets the maximum time (between 6 and 40 seconds) a switch can wait without receiving a BPDU before attempting to reconfigure.	M
		maxhops	<max-hops>	Sets the number of hops (between 1 and 255) in an MSTP region before the BPDU is discarded and the port information is aged.	M

Table 184 switch Commands (continued)

COMMAND				DESCRIPTION	P
		priority	<mstid> <priority>	Sets the priority of the switch for the instance ranges. The lower the number, the more likely the switch will be chosen as the root bridge. Enter 0, 4096, 8192, 12288, 16384, 20480, 24576, 28672, 32768, 36864, 40960, 45056, 49152, 53248, 57344 or 61440 in this field.	M
		revision	<revision level>	Sets the configuration version number (0 - 65535).	M
		show		Displays MSTP settings.	L
		version	rstp|mstp	Sets the spanning tree protocol version the switch uses.	M
		vlanmap	<mstid> <vid> [<end_vid>]	Sets the VLAN-MSTID mapping.	M
	port	disable	<giga-port>	Turns off data transmission on a port.	M
		dscp	disable <giga-port>	Deactivates DSCP-IEEE 802.1p mappings on this port.	M
			enable <giga-port>	Activates DSCP-IEEE 802.1p mappings on this port.	M
			set <giga-port> <srccp> <mapcp> <mappri>	Sets DSCP-IEEE 802.1p mappings on this port. <srccp>: source code point, 0~63, example: 1,3~5,10~15 <mapcp>: code point, 0~63 <mappri>: priority, 0~7	M
			show [<giga-port>]	Displays DSCP-IEEE 802.1p mappings on this port.	L
		enable	<giga-port>	Turns on data transmission on a port.	M
		flowctrl	disable <giga-port>	Turns off flow control on a port.	M
			enable <giga-port>	Turns on flow control on a port.	M
		frametype	<giga-port> all|tag	Sets the port(s) to accept VLAN tagged and untagged Ethernet frames or only tagged.	M
		gvrp	disable <giga-port>	Turns on GVRP for a port(s).	M
			enable <giga-port>	Turns off GVRP for a port(s).	M
		mode	<giga-port> uplink|subtend	Sets a port to operate as uplink or subtending.	M
		mstp	disable <giga-port> <mstid>	Deactivates MSTP on the port in the spanning tree instance.	M
			enable <giga-port> <mstid>	Activates MSTP on the port in the spanning tree instance.	M
			pathcost <giga-port> <mstid> <pathcost>	Sets the path cost (between 0 and 200000000). Enter 0 to have the system automatically set the path cost based on the link speed.	M

Table 184 switch Commands (continued)

COMMAND				DESCRIPTION	P
			p2plink <giga-port> auto|enable|disable	Enables point-to-point connection.	M
			priority <giga-port> <mstid> <priority>	Specify the priority (0 - 255) of the Ethernet port in the MST region. The system automatically rounds the number to the nearest multiple of 16.	M
			show <mstid> [<end_mstid>]	Displays MSTP settings.	L
		name	<giga-port> <name>	Sets the name of a port.	M
		priority	<giga-port> <priority>	Sets a port's default ingress user priority (0~7).	M
		pvid	<giga-port> <vid>	Sets the PVID (Port VLAN ID) (1~4094) assigned to untagged frames or priority frames (0 VID) received on this port(s).	M
		show		Displays port settings.	L
		speed	<giga-port> <speed>	Sets a port's speed and duplex mode.	M
		vlantrunk	disable <giga-port>	Turns off VLAN trunking on a port to have it only accept frames with registered VIDs.	M
			enable <giga-port>	Turns on VLAN trunking on a port to have it accept frames with any VID.	M
	qschedule	set	<giga-port> spq or <giga-port> wrr <wt0> <wt1> <wt2> <wt3> <wt4> <wt5> <wt6> <wt7>	Sets a port's queuing method and/or priority weight. spq = strict priority queuing algorithm wrr = weighted round robin queue algorithm <wt0>~<wt7> = priority weight, 0~15	M
		show		Displays the queuing settings.	L
	queuemap	set	<priority> <queue>	Sets a queue's priority.	M
		show		Displays the queues' priorities.	L

30.3 switch bandwidth Commands

Use the `switch bandwidth` commands to configure bandwidth control.

30.3.1 switch bandwidth disable Command

Syntax:

```
switch bandwidth enable <giga-port>
```

where

`<giga-port>`	=	This represents Gigabit Ethernet uplink ports, subtending ports or all ports. Use `sub1|sub2|up1|up2|all` if trunking is not enabled. Use `sub|up|all` if trunking is enabled.

This command turns on bandwidth control on the specified Gigabit Ethernet interface (or all of them).

This example turns off bandwidth control for the uplink 1 port.

```
ras>  switch bandwidth disable up1
```

30.3.2 switch bandwidth enable Command

Syntax:

```
switch bandwidth enable <giga-port>
```

where

`<giga-port>`	=	This represents Gigabit Ethernet uplink ports, subtending ports or all ports. Use `sub1|sub2|up1|up2|all` if trunking is not enabled. Use t`sub|tup|all` if trunking is enabled.

This command turns on bandwidth control on the specified port(s).

This example turns on bandwidth control for the subtending 2 port.

```
ras>  switch bandwidth enable sub2
```

30.3.3 switch bandwidth set Command

Syntax:

```
switch bandwidth set <giga-port> <ingress-rate> <egress-rate>
```

where

<giga-port>	=	This represents Gigabit Ethernet uplink ports, subtending ports or all ports. Use `sub1|sub2|up1|up2|all` if trunking is not enabled. Use `sub|up|all` if trunking is enabled.
<ingress-rate>	=	The maximum bandwidth allowed in megabits per second (Mbps) for the incoming traffic flow on a port. Use a number between 1 and 1000.
<egress-rate>	=	The maximum bandwidth allowed in megabits per second (Mbps) for the out-going traffic flow on a port. Use a number between 1 and 1000.

This command sets the incoming or outgoing bandwidth control for the specified port(s).

This example sets the subtending 2 port to only allow 128 Mbps for incoming traffic and 512 Mbps for outgoing traffic.

```
ras>  switch bandwidth set sub2 128 512
```

30.3.4 switch bandwidth show Command

Syntax:

`switch bandwidth show`

This command displays the bandwidth control settings on the Gigabit Ethernet interfaces.

This example displays the bandwidth control settings on the Ethernet ports.

```
ras> switch bandwidth show
port  enable ingress(Mbps)  egress(Mbps)
----- ------ ------------- -------------
 sub1   -                0             0
 sub2   -                0             0
  up1   -                0             0
  up2   -                0             0
'0' = disable
```

“V” displays for ports that have bandwidth control enabled “-” displays for ports that do not.

30.4 switch bcasctrl Commands

Use the `switch bcasctrl` commands to configure broadcast storm control.

30.4.1 switch bcastctrl threshold Command

Syntax:

`switch bcasctrl threshold <giga-port> <bc-limit> <mc-limit> <uu-limit>`

where

`<giga-port>`	=	This represents Gigabit Ethernet uplink ports, subtending ports or all ports. Use `sub1|sub2|up1|up2|all i`f trunking is not enabled. Use `sub|up|all` if trunking is enabled.
`<bc-limit>`	=	Sets how many broadcast packets the interface is allowed to receive per second. 0~262143, use -1 to disable.
`<mc-limit>`	=	Sets how many multicast packets the interface is allowed to receive per second. 0~262143, use -1 to disable.
`<uu-limit>`	=	Sets how many unknown unicast packets the interface is allowed to receive per second. 0~262143, use -1 to disable.

This command sets the limitations of broadcast, multicast and unknown unicast packets, in packets per second for each Gigabit Ethernet port.

This example sets the subtending 1 interface to accept up to 80,000 broadcast packets, 100,000 multicast packets and 60,000 unknown unicast packets per second.

```
ras> switch bcastctrl threshold sub1 80000 100000 60000
```

30.4.2 switch bcastctrl show Command

Syntax:

`switch bcasctrl show`

This command displays the broadcast storm control settings. The following shows an example.

```
ras> switch bcastctrl show
port broadcast(pkt/s) multicast(pkt/s) uucast(pkt/s)
---- ---------------- ---------------- ----------------
sub1       80000            100000            60000
sub2        -                 -                 -
 up1        -                 -                 -
 up2        -                 -                 -
ras>
```

30.5 switch dot3ad Commands

Use the `switch dot31d` commands to configure static and dynamic (LACP) port trunking.

30.5.1 switch dot3ad lacp priority Command

Syntax:

`switch dot3ad lacp priority <priority>`

where

`<priority>`	=	LACP system priority is a number between 1 and 65,535. The switch with the lowest system priority (and lowest port number if system priority is the same) becomes the LACP “server”. The LACP “server” controls the operation of LACP setup. Enter a number to set the priority of an active port using Link Aggregate Control Protocol (LACP). The smaller the number, the higher the priority level.

This command sets the LACP system priority.

This example sets the MSC1000G’s priority to 1000.

```
ras> switch dot3ad lacp priority 1000
```

30.5.2 switch dot3ad lacp timeout Command

Syntax:

```
switch dot3ad lacp priority timeout short|long
```

where

`timeout short|long`	=	Timeout is the time interval between the individual port exchanges of LACP packets in order to check that the peer port in the trunk group is still up. If a port does not respond after three tries, then it is deemed to be "down" and is removed from the trunk. Set a short timeout (one second) for busy trunked links to ensure that disabled ports are removed from the trunk group as soon as possible. Select either short (1 second) or long (30 seconds).

This command sets the time interval between exchanging LACP packets.

This example sets the MSC1000G's to exchange LACP packets with the peer every second

```
ras> switch dot3ad lacp timeout short
```

30.5.3 switch dot3ad lacp show Command

Syntax:

```
switch dot3ad lacp show
```

This command displays the MSC1000G's LACP settings. The following shows an example.

```
ras> switch dot3ad lacp show
priority : 1000
time out : short (1 sec)
ras>
```

30.5.4 switch dot3ad enable Command

Syntax:

```
switch dot3ad enable sub|up [lacp]
```

where

`sub`	=	The subtending ports
`up`	=	The uplink ports.
`[lacp}`	=	Turns on LACP protocol.

This command turns on link aggregation on subtending or uplink ports.

This example sets the MSC to use link aggregation on the subtending ports. This also copies the configuration of subtending port one to subtending port two. The system asks you to confirm if this is what you want to do.

```
ras> switch dot3ad enable sub
Enabling sub trunking will copy configurations of port sub1 to port sub2
Configurations of port sub2 will be lost!
Do you wish to continue? ('y' to continue)
```

30.5.5 switch dot3ad disable Command

Syntax:

`switch dot3ad disable sub|up`

where

`sub`	=	The subtending ports
`up`	=	The uplink ports.

This command turns off link aggregation on subtending or uplink ports.

This example sets the MSC to not use link aggregation on the uplink ports.

```
ras> switch dot3ad disable up
```

30.5.6 switch dot3ad show Command

Syntax:

`switch dot3ad show`

This command displays the link aggregation state of the trunk groups.

This command displays the link aggregation state of the subtending and uplink ports.

Here is an example.

```
ras> switch dot3ad show
agg  enable  type  port
---- ------ ------ -------------------------------------------------
tsub   -    static sub1 sub2
tup    -    static up1 up2
```

“V” displays for trunking groups that have link aggregation enabled “-” displays for ports that do not.

30.6 switch garptimer Commands

Use the `switch garptimer` commands to configure GARP timeout periods.

30.6.1 switch garptimer show Command

Syntax:

```
switch garptimer show
```

This command displays the MSC1000G's GARP timer settings, including the join, leave and leave-all timers. An example is shown next.

```
ras> switch garptimer show
join time     (ms): 200
leave time    (ms): 600
leaveall time (ms): 10000
ras>
```

30.6.2 switch garptimer join Command

Syntax:

```
switch garptimer join <join msec>
```

where

`<join msec>`	=	This sets the duration of the Join Period timer for GVRP in milliseconds. Each port has a Join Period timer. The allowed Join Time range is between 100 and 32767 milliseconds; the default is 200 milliseconds.

This command sets the MSC1000G's join period timer for GVRP in milliseconds.

Switches join VLANs by making a declaration. A declaration is made by issuing a Join message using GARP. GARP timers set declaration timeout values.

The following example sets the Join Timer to 300 milliseconds.

```
ras> switch garptimer join 300
```

30.6.3 switch garptimer leave Command

Syntax:

```
switch garptimer leave <leave msec>
```

where

`<leave msec>`	=	This sets the duration of the Leave Period timer for GVRP in milliseconds. Each port has a single Leave Period timer. Leave Time must be two times larger than Join Timer; the default is 600 milliseconds. The allowed Leave Time range is between 201 and 65534 milliseconds; the default is 600 milliseconds.

This command sets the MSC1000G's leave period timer for GVRP in milliseconds.

Switches join VLANs by making a declaration. Declarations are withdrawn by issuing a Leave message. GARP timers set declaration timeout values.

The following example sets the Leave Timer to 800 milliseconds.

```
ras> switch garptimer leave 800
```

30.6.4 switch garptimer leaveall Command

Syntax:

```
switch garptimer leaveall <leaveall msec>
```

where

`<leaveall msec>`	=	This sets the duration of the Leave All Period timer for GVRP in milliseconds. Each port has a single Leave All Period timer. Leave All Timer must be larger than Leave Timer. The allowed Leave Time range is between 201 and 65535 milliseconds; the default is 10000 milliseconds.

This command sets the MSC1000G's leave all period timer for GVRP in milliseconds.

Switches join VLANs by making a declaration. A declaration is made by issuing a Join message using GARP. A Leave All message terminates all registrations. GARP timers set declaration timeout values.

The following example sets the Leave All Timer to 11000 milliseconds.

```
ras> switch garptimer leaveall 11000
```

30.6.5 switch garptimer set Command

Syntax:

```
switch garptimer set <join-msec> <leave-msec> <leaveall-msec>
```

where

`<join msec>`	=	This sets the duration of the Join Period timer for GVRP in milliseconds. Each port has a Join Period timer. The allowed Join Time range is between 100 and 32767 milliseconds; the default is 200 milliseconds.
`<leave msec>`	=	This sets the duration of the Leave Period timer for GVRP in milliseconds. Each port has a single Leave Period timer. Leave Time must be two times larger than Join Timer; the default is 600 milliseconds. The allowed Leave Time range is between 201 and 65534 milliseconds; the default is 600 milliseconds.
`<leaveall msec>`	=	This sets the duration of the Leave All Period timer for GVRP in milliseconds. Each port has a single Leave All Period timer. Leave All Timer must be larger than Leave Timer. The allowed Leave Time range is between 201 and 65535 milliseconds; the default is 10000 milliseconds.

This command sets the MSC1000G's Join, Leave and Leave All timers.

The following example sets the Join Timer to 300 milliseconds, the Leave Timer to 900 milliseconds and the Leave All Timer to 12000 milliseconds.

```
ras> switch garptimer join 300 900 12000
```

30.7 switch isolation Commands

Use the `switch isolation` commands to configure the subscriber isolation feature. Use subscriber isolation to block communications between subscriber ports. When you enable subscriber isolation you do not need to configure the VLAN to isolate subscribers.

Turn on VLAN isolation to block communications between subscribers in different VLANs if you do not block communications between subscriber ports. For example, you might want to isolate some VLANs (for example, high-speed Internet) and not isolate other VLANs (for example, VoIP).

30.7.1 switch isolation show Command

Syntax:

```
switch isolation show
```

This command displays the MSC1000G's subscriber isolation and VLAN isolation settings. An example is shown next.

```
ras> switch isolation show
port isolation :disabled
isolated vlan list:
----
5
938
```

30.7.2 switch isolation enable Command

Syntax:

```
switch isolation enable
```

This command turns on the MSC1000G's subscriber isolation setting. An example is shown next.

```
ras> switch isolation enable
port isolation :enabled
ras>
```

30.7.3 switch isolation disable Command

Syntax:

```
switch isolation disable
```

This command turns off the MSC1000G's subscriber isolation setting. An example is shown next.

```
ras> switch isolation disable
port isolation :enabled
ras>
```

30.7.4 switch isolation vlan delete Command

Syntax:

```
switch isolation vlan delete <vid>
```

where

`<vid>` = The VLAN ID [1 – 4094].

This command turns off per-VLAN isolation for the specified VLAN.

Per-VLAN isolation only works when the regular switch isolation feature is disabled (see Section 30.7.3 on page 538).

The following example turns off per-VLAN isolation for VLAN 5.

```
ras> switch isolation vlan delete 5
ras> switch isolation show
port isolation :disabled
isolated vlan list:
----
938
```

30.7.5 switch isolation vlan set Command

Syntax:

```
switch isolation vlan set <vid>
```

where

`<vid>` = The VLAN ID [1 – 4094].

This command turns on per-VLAN isolation for the specified VLAN.

Per-VLAN isolation only works when the regular switch isolation feature is disabled (see Section 30.7.3 on page 538).

The following example turns on per-VLAN isolation for VLAN 5.

```
ras> switch isolation vlan set 5
ras> switch isolation show
port isolation :disabled
isolated vlan list:
----
5
938
```

30.8 switch mstp Commands

Use the `switch mstp` commands to configure multiple spanning tree settings on the system.

30.8.1 switch mstp cfgname Command

Syntax:

`switch mstp cfgname <config name>`

where

`<config name>` = A unique name (up to 31 characters) that identifies an MST region.

This command sets the switch to belong to the specified MST region.

The following example sets the switch to be a member of the `test` MST region.

```
ras> switch mstp cfgname test
```

30.8.2 switch mstp disable Command

Syntax:

`switch mstp disable`

This command deactivates the MSTP feature on the switch.

30.8.3 switch mstp enable Command

Syntax:

`switch mstp enable`

This command activates the MSTP feature on the system.

30.8.4 switch mstp fwdelay Command

Syntax:

`switch mstp fwdelay <fwdelay-sec>`

This command sets the forward delay period (between 4 and 30 seconds) the switch waits before changing states.

The following example sets the forward delay time to 15 seconds.

```
ras> switch mstp fwdelay 15
```

30.8.5 switch mstp hellotime Command

Syntax:

```
switch mstp hellotime <hellotime-sec>
```

This command sets the time interval (between 1 and 10 seconds) between BPDU (Bridge Protocol Data Units) configuration message generations by the root switch.

The following example sets the hello time to 5 seconds.

```
ras> switch mstp hellotime 5
```

30.8.6 switch mstp maxage Command

Syntax:

```
switch mstp maxage <maxage-sec>
```

This command sets the maximum time (between 6 and 40 seconds) a switch can wait without receiving a BPDU before attempting to reconfigure.

The following example sets the maximum age to 20 seconds.

```
ras> switch mstp maxage 20
```

30.8.7 switch mstp maxhops Command

Syntax:

```
switch mstp maxhops <max-hops>
```

This command sets the number of hops (between 1 and 255) in an MSTP region before the BPDU is discarded and the port information is aged.

The following example sets the maximum hop count to 20. After 20 hops (or passing through 20 devices), a BPDU is dropped.

```
ras> switch mstp maxhops 20
```

30.8.8 switch mstp priority Command

Syntax:

```
switch mstp priority <mstid> <priority>
```

where

<mstid>	=	Index number (between 0-16) to identify a spanning tree instance. For CIST, enter 0. To identify an MSTI, enter a number between 1 and 16.
<priority>	=	Priority level (0 ~ 61440) in increments of 4096. The system automatically rounds the number to the nearest multiples of 4096.

This command sets the priority of the switch for the specific spanning tree instance. The lower the number, the more likely the switch will be chosen as the root bridge within the spanning tree instance.

The following example sets the priority of the switch to 24576 in the spanning tree instance 10.

```
ras> switch mstp priority 10 24576
```

30.8.9 switch mstp revision Command

Syntax:

```
switch mstp revision <revision>
```

This command sets a number to identify a region's configuration. Devices must have the same revision level to belong to the same region.

The following example sets the revision number of the switch to 1.

```
ras> switch mstp revision 1
```

30.8.10 switch mstp show Command

Syntax:

```
switch mstp show
```

This command displays the general MSTP settings on the switch. The following figure shows an example.

```
ras> switch mstp show
config name      : test
revision level   : 1
status           : disabled
priority         : 32768
hello time    (s): 5
max age       (s): 20
forward delay (s): 15
force version    : mstp
max hops         : 20

msti  priority
----- -----------------------------------------------
 1- 8 32768 32768 32768 32768 32768 32768 32768 32768
 9-16 32768 24576 32768 32768 32768 32768 32768 32768

mstid vid
----- -----------------------------------------------
    0 1,11-4094
    1 2
    2 3-10

vid       mstid
--------- -----
        1     0
        2     1
   3-  10     2
  11-4094     0

ras>
```

30.8.11 switch mstp version Command

Syntax:

```
switch mstp version <rstp|mstp>
```

This command sets the system to use and send BPDUs for the specified spanning tree protocol.

The following example sets the spanning tree protocol to RSTP.

```
ras> switch mstp version rstp
```

30.8.12 switch mstp vlanmap Command

Syntax:

```
switch mstp vlanmap <mstid> <start_vid> <end_vid>
```

where

<mstid>	=	Index number (between 0-16) to identify a spanning tree instance. For CIST, enter 0. To identify an MSTI, enter a number between 1 and 16.
<start_vid>	=	Start of the VLAN range.
<end_vid>	=	End of the VLAN range.

This command creates a mapping of the specified VLAN range and spanning tree instance. You can map multiple VLANs to the same spanning tree instance. You cannot map a VLAN to multiple spanning tree instances. Devices in the same MST region must have the same VLAN-to-MST instance mapping(s).

Make sure the VLAN(s) is not already configured for multicasting or VLAN stacking.

The following example maps VLAN 2 to instance 1 and the VLAN range (3~10) to instance 2.

```
ras> switch mstp vlanmap 1 2 2
ras> switch mstp vlanmap 2 3 10
```

30.9 switch port Commands

Use these commands to manage the MSC1000G's Gigabit Ethernet interfaces.

30.9.1 switch port disable Command

Syntax:

```
switch port disable <giga-port>
```

This command turns off data transmission on a Gigabit Ethernet interface.

The following example turns off the subtending 1 Gigabit Ethernet interface.

```
ras> switch port disable sub1
```

30.9.2 DSCP Overview

DiffServ Code Point (DSCP) is a field used for packet classification on DiffServ networks. The higher the value, the higher the priority. Lower-priority packets may be dropped if the total traffic exceeds the capacity of the network.

30.9.3 switch port dscp Commands

Use the `switch port DSCP` commands to show and configure the DSCP mapping and DSCP to IEEE 802.1p mapping for the Gigabit Ethernet interfaces.

30.9.3.1 switch port dscp disable Command

Syntax:

```
switch port dscp disable <giga-port>
```

This command turns off DSCP to DSCP mapping and DSCP to IEEE 802.1p mapping on a Gigabit Ethernet interface.

The following example turns off DSCP to DSCP mapping and DSCP to IEEE 802.1p mapping on the subtending 1 Gigabit Ethernet interface.

```
ras> switch port dscp disable sub1
```

30.9.3.2 switch port dscp enable Command

Syntax:

```
switch port dscp enable <giga-port>
```

This command turns on DSCP to DSCP mapping and DSCP to IEEE 802.1p mapping on a Gigabit Ethernet interface.

The following example turns on DSCP to DSCP mapping and DSCP to IEEE 802.1p mapping on the subtending 1 Gigabit Ethernet interface.

```
ras> switch port dscp enable sub1
```

30.9.3.3 switch port dscp set Command

Syntax:

```
switch port dscp set <giga-port> <srccp> <mapcp> <mappri>
```

where

`<srccp>`	Specify a source DiffServ Code Point (DSCP) or points, 0~63. For example: `1,3~5,10~15`
`<mapcp>`	Specify the DSCP (0~63) to which you want to map the source DSCP (or DSCPs).
`<mappri>`	Specify the IEEE 802.1p priority (0~7) to which you would like to map the source DSCP (or DSCPs).

This command configures DSCP to DSCP mapping and DSCP to IEEE 802.1p mapping on a Gigabit Ethernet interface. You can change the DSCP of received (IEEE 802.1p tagged) packets to a different DSCP. You can also map it to a specific IEEE 802.1p priority.

The following example sets subtending 1 Gigabit Ethernet interface to map packets with a source DSCP of 7 to a DSCP of 5 and a IEEE 802.1p priority of 1.

```
ras> switch port dscp set sub1 7 5 1
```

30.9.3.4 switch port dscp show Command

Syntax:

```
switch port dscp show [<giga-port>]
```

This command displays the DSCP to DSCP mapping and DSCP to IEEE 802.1p mapping settings on a Gigabit Ethernet interface.

The following example displays the subtending 1 Gigabit Ethernet interface's DSCP to DSCP mapping and DSCP to IEEE 802.1p mapping settings.

```
ras> switch port dscp show sub1

sub1 dscp mapping(codepoint/priority): disabled
     00   01   02   03   04   05   06   07   08   09
   ---- ---- ---- ---- ---- ---- ---- ---- ---- ----
00  0/0  1/0  2/0  3/0  4/0  5/0  6/0  5/1  8/1  9/1
10 10/1 11/1 12/1 13/1 14/1 15/1 16/2 17/2 18/2 19/2
20 20/2 21/2 22/2 23/2 24/3 25/3 26/3 27/3 28/3 29/3
30 30/3 31/3 32/4 33/4 34/4 35/4 36/4 37/4 38/4 39/4
40 40/5 41/5 42/5 43/5 44/5 45/5 46/5 47/5 48/6 49/6
50 50/6 51/6 52/6 53/6 54/6 55/6 56/7 57/7 58/7 59/7
60 60/7 61/7 62/7 63/7
```

The top row and first column identify the source DSCP. The other rows identify the DSCP to which the source DSCP is mapped followed by the IEEE 802.1p priority to which it is mapped. The bolded section in this example shows that packets received with a DSCP of 7 get their code point changed to 5 and are given an IEEE 802.1p priority of 1.

30.9.4 switch port enable Command

Syntax:

```
switch port enable <giga-port>
```

This command turns on data transmission on a Gigabit Ethernet interface.

The following example turns on the subtending 1 Gigabit Ethernet interface.

```
ras> switch port enable sub1
```

30.9.5 switch port flowctrl disable Command

Syntax:

```
switch port flowctrl disable <giga-port>
```

This command turns off flow control on a Gigabit Ethernet interface.

The following example turns off the flow control on the subtending 1 Gigabit Ethernet interface.

```
ras> switch port flowctrl disable sub1
```

30.9.6 switch port flowctrl enable Command

Syntax:

```
switch port flowctrl enable <giga-port>
```

This command turns on flow control on a Gigabit Ethernet interface.

The following example turns on the flow control on the subtending 1 Gigabit Ethernet interface. .

Figure 192 switch port flowctrl enable Command Example

```
ras> switch port flowctrl enable sub1
```

30.9.7 switch port frametype Command

Syntax:

```
switch port frametype <giga-port> all|tag
```

where

`all|tag`	=	Specifies all Ethernet frames (tagged and untagged) or only tagged Ethernet frames.

This command sets the specified port to accept all Ethernet frames or only those with an IEEE 802.1Q VLAN tag.

The following example sets ports the subtending 1 Gigabit Ethernet interface to accept only tagged frames.

```
ras switch port frametype sub1 tag
```

30.9.8 switch port gvrp Commands

Use the `switch port gvrp` commands to configure GVRP settings for the Gigabit Ethernet interfaces.

30.9.8.1 switch port gvrp disable Command

Syntax:

```
switch port gvrp disable <giga-port>
```

This command turns off GVRP on a Gigabit Ethernet interface.

GVRP (GARP VLAN Registration Protocol) is a registration protocol that defines a way for switches to register necessary VLAN members on ports across the network. Disable GVRP to have the MSC1000G not propagate VLAN information to other devices.

The following example turns off GVRP on the subtending 1 Gigabit Ethernet interface.

```
ras> switch port gvrp disable sub1
```

30.9.8.2 switch port gvrp enable Command

Syntax:

```
switch port gvrp enable <giga-port>
```

This command turns on GVRP on a Gigabit Ethernet interface.

GVRP (GARP VLAN Registration Protocol) is a registration protocol that defines a way for switches to register necessary VLAN members on ports across the network. The MSC1000G propagates VLAN information to other devices when you enable GVRP.

The following example turns on GVRP on the subtending 1 Gigabit Ethernet interface.

```
ras> switch port gvrp enable sub1
```

30.9.9 switch port mode Command

Syntax:

```
switch port mode sub1|sub2|up1|up2 <uplink|subtend>
```

This command sets a Gigabit Ethernet interface to function as uplink or subtending.

The following example sets the subtending 1 Gigabit Ethernet interface to uplink mode.

```
ras> switch port mode sub1 uplink
```

30.9.10 switch port mstp Commands

Use the `switch port mstp` commands to configure multiple spanning tree settings for the Gigabit Ethernet interfaces.

30.9.10.1 switch port mstp disable Command

Syntax:

```
switch port mstp disable sub1|sub2|up1|up2|all <mstid>
```

where

`<mstid>` = A unique number to identify an MST region. Enter 0 to for CIST. For MSTI, enter a number between 1 and 16.

This command disables MSTP on the specified Gigabit Ethernet interface port (or all of them) in the specified spanning tree instance. All MSTP packets to/from the specified spanning tree instance will be dropped on the port.

The following example disables MSTP on unlink port 1 in spanning tree instance 2.

```
ras> switch port mstp disable up1 2
```

30.9.10.2 switch port mstp edgeport Command

Syntax:

```
switch port mstp edgeport <giga-port> <mstid> <enable|disable>
```

This command enables or disables the specified Gigabit Ethernet interface as an edge port that connects to a non-SPT device (such as a computer or hub).

The following example sets subtending port 2 as an edge port.

```
ras> switch port mstp edgeport sub2 enable
```

30.9.10.3 switch port mstp enable Command

Syntax:

```
switch port mstp enable sub1|sub2|up1|up2|all <mstid>
```

This command sets the specified Gigabit Ethernet interface to participate in the spanning tree instance.

The following example activates MSTP on all Gigabit Ethernet interfaces in the spanning tree instance 3.

```
ras> switch port mstp enable all 3
```

30.9.10.4 switch port mstp p2plink Command

Syntax:

```
switch port mstp p2plink <giga-port> auto|enable|disable
```

where

`auto`	=	The switch automatically determines if the link is point-to-point based on the port's duplex mode setting.
`enable`	=	Activates this feature on a full-duplex port that is connected directly to another switch port.
`disable`	=	Deactivates this feature on the port that is in half-duplex mode.

Enable a point-to-point link between Gigabit Ethernet interfaces to increase the speed of convergence by allowing the network to determine the designated port faster. The port must be connected directly to another switch port.

The following example activates point-to-point link on uplink port 2.

```
ras> switch port mstp p2plink up2 enable
```

30.9.10.5 switch port mstp pathcost Command

Syntax:

```
switch port mstp pathcost <giga-port> <mstid> <cost>
```

This command sets the path cost of the specified Gigabit Ethernet interface in the spanning tree. The path cost can be between 0 and 200000000. A smaller number means a lower path cost. For paths with the same priority, the switch will select the one on lower interface number first. 0 sets the system automatically determines the path cost based on the line speed.

The following example sets the path cost of uplink interface 1 to 200 in spanning tree 10.

```
ras> switch port mstp pathcost up1 10 200
```

30.9.10.6 switch port mstp priority Command

Syntax:

```
switch port mstp priority <giga-port> |all <mstid> <priority>
```

This command sets the priority (between 0 and 255 in multiples of 16) of the Gigabit Ethernet interface in the specified spanning tree. When a loop occurs and two root ports have the same cost, the port with higher priority (lower numerical value) becomes the root port and the other port becomes an alternate port. For ports with the same priority, the switch will select the one on lower interface number first.

The following example sets the port priority of uplink interface 1 to 16 in spanning tree 10.

```
ras> switch port mstp priority up1 10 16
```

30.9.10.7 switch port mstp show Command

Syntax:

```
switch port mstp show <mstid> [<end_mstid>]
```

This command displays the specified MSTP's settings on each Gigabit Ethernet interface. The following example displays the port MSTP setting for spanning tree 10.

```
ras> switch port mstp show 10
[msti 10]
port  en  prio pathcost
---- ---- ---- ---------
sub1  -   128          0
sub2  -   128          0
 up1  V   128         16
 up2  -   128          0
```

30.9.11 switch port name Command

Syntax:

```
switch port name <giga-port> <name>
```

where

<name> = A name to identify the port.

This command sets the name of a Gigabit Ethernet interface.

The following example sets the name of uplink interface 1 to xyz.

```
ras>  switch port name up1 xyz
```

30.9.12 switch port priority Command

Syntax:

```
switch port priority <giga-port> <priority>
```

where

<priority> = The default ingress priority (0~7).

This command sets the default ingress user priority of a Gigabit Ethernet interface.

The following example sets the default priority of uplink interface 1 to 3.

```
ras> switch port priority up1 3
```

30.9.13 switch port pvid Command

Syntax:

```
switch port pvid <giga-port> <vid>
```

where

<pvid> = The default Port VLAN ID (PVID) assigned to untagged frames or priority-tagged frames received on this port. 1~4094.

This command sets the Port VLAN ID assigned to untagged frames or priority frames (0 VID) received on this port(s).

The following example sets the PVID of uplink interface 1 to 76.

```
ras>  switch port pvid up1 76
```

30.9.14 switch port show Command

Syntax:

```
switch port show
```

This command displays the settings for the MSC1000G's Gigabit Ethernet interfaces. An example is shown next.

```
ras> switch port show
port       name        en  mode speed   fc  pvid prio gvrp ftype  vt  dscp
----- --------------- ---- ---- ------ ---- ---- ---- ---- ----- ---- ----
 sub1 Subtend1         V    up  auto    -   1    0     -   all    -    -
 sub2 Subtend2         V    up  auto    -   1    0     -   all    -    -
  up1 Uplink1          V    up  auto    -   1    0     -   all    -    -
  up2 Uplink2          V    up  auto    -   1    0     -   all    -    -
```

30.9.15 switch port speed Command

Syntax:

```
switch port speed <giga-port> <speed>
```

where

`<giga-port>`	=	This represents 1000BaseT uplink ports. The port speed is fixed for subtending ports and/or SFP slots that use a fiber-optic interface. Use `up1|up2|all` if trunking is not enabled. Use `tup|all` if trunking is enabled.
`<speed>`	=	The port's speed and duplex mode. Use `auto|1000F|100F|100H`. Auto or 1000 (Mbps) or 100 (Mbps) is to match the port speed of the WAN switch to which this port is to connect. F is for full duplex communications or H for half duplex communications.

This command sets the port speed and duplex of a 1000BaseT uplink port(s).

The following example sets the speed of the uplink 1 Gigabit Ethernet interface to 1000 Mbps and the duplex to full.

```
ras>  switch port speed up1 1000F
```

30.10 switch port vlantrunk Commands

Use these commands to turn VLAN trunking on or off for the Gigabit Ethernet interfaces.

30.10.1 switch port vlantrunk enable Command

Syntax:

```
switch port vlantrunk enable <giga-port>
```

where

`<giga-port>`	=	This represents Gigabit Ethernet uplink ports, subtending ports or all ports. Use `sub1|sub2|up1|up2|all` if trunking is not enabled. Use `tsub|tup|all` if trunking is enabled.

This command sets a Gigabit Ethernet interface(s) to use VLAN trunking in order to accept frames with any VID.

The following example sets the subtending 1Gigabit Ethernet interface to use VLAN trunking.

```
ras>  switch port vlantrunk enable sub1
```

30.10.2 switch port vlantrunk disable Command

Syntax:

```
switch port vlantrunk disable <giga-port>
```

where

`<giga-port>`	=	This represents Gigabit Ethernet uplink ports, subtending ports or all ports. Use `sub1|sub2|up1|up2|all` if trunking is not enabled. Use `tsub|tup|all` if trunking is enabled.

This command sets a Gigabit Ethernet interface(s) to not use VLAN trunking so the port only accepts frames with registered VIDs.

The following example sets the subtending 1Gigabit Ethernet interface to not use VLAN trunking.

```
ras>  switch port vlantrunk disable sub1
```

30.11 switch qschedule Commands

Use these commands to set a port's queuing method and/or priority weight.

30.11.1 switch qschedule set Command

Syntax:

```
switch qschedule set <giga-port> spq
```

or

```
<giga-port> wrr <wt0> <wt1> <wt2> <wt3> <wt4> <wt5> <wt6> <wt7>
```

where

`spq`	=	Strict Priority Queuing (SPQ) services queues based on priority only. When the highest priority queue empties, traffic on the next highest-priority queue begins.
`wrr`	=	Weighted Round Robin services queues based on their priority and queue weight. WRR is activated only when a port has more traffic than it can handle.
`<wt0> <wt1> <wt2> <wt3> <wt4> <wt5> <wt6> <wt7>`	=	The priority weight for each queue, 0~15.

This command sets a Gigabit Ethernet interface's queuing method and/or priority weight.

The following example sets the subtending interface 1 to use strict priority queuing.

```
ras>  switch qschedule set sub1 spq
```

30.11.2 switch qschedule show Command

Syntax:

```
switch qschedule show
```

This command shows the queuing methods and/or priority weights of the Gigabit Ethernet interfaces. This is an example.

```
ras> switch qschedule show
port  algo_type wt0 wt1 wt2 wt3 wt4 wt5 wt6 wt7
----- --------- --- --- --- --- --- --- --- ---
 sub1 spq         -   -   -   -   -   -   -   -
 sub2 spq         -   -   -   -   -   -   -   -
  up1 spq         -   -   -   -   -   -   -   -
  up2 spq         -   -   -   -   -   -   -   -
```

30.12 switch queuemap Commands

Use these commands to set the priorities of the individual queues.

30.12.1 switch queuemap set Command

Syntax:

```
switch queuemap set <priority> <queue>
```

where

`<priority>`	=	The IEEE 802.1p priority for each queue, 0~7.
`<queue>`	=	A physical queue in the MSC1000G, 0~7.

This command sets the MSC1000G to use a particular queue for traffic of a specific IEEE 802.1p priority.

The following example sets the MSC1000G to use queue 3 for traffic with priority 3.

```
ras>  switch queuemap set 3 3
```

30.12.2 switch queuemap show Command

Syntax:

```
switch queuemap show
```

This command shows which queue the MSC1000G uses for traffic of each priority. The following is an example.

```
ras> switch queuemap show
priority queue
-------- -----
       0     2
       1     0
       2     1
       3     3
       4     4
       5     5
       6     6
       7     7
ras>
```

31

sys Commands

This chapter shows you how to use the sys commands.

31.1 sys Commands Overview

The sys commands are for system management and maintenance.

31.2 sys Commands Summary

The following table lists the sys commands. The **P** column on the right indicates the administrator privilege level needed to use the command (**H** for high, **M** for middle or **L** for low).

Table 185 sys Commands

COMMAND				DESCRIPTION	P
sys					
	baud	set 9600|19200|38400|57600|115200		Sets the console port speed.	M
		show		Displays the console port speed.	L
	chsh	[engsh|stdsh]		Changes to normal or privileged command shell.	H
	client	disable	<index>	Turns off a secured client set.	M
		enable	<index>	Turns on a secured client set.	M
		set	<index> <start-ip> <end-ip> [telnet] [ftp] [web] [icmp] [ssh] [snmp]	Sets a group of trusted computers from which you can manage the switch.	M
		show		Displays the secured client sets.	L
	date	set	<yyyy> <mm> <dd>	Sets the system date.	M
		show		Displays the current system date.	L
	info	chassis	<chassis>	Sets the system chassis number (1~64).	M
		contact	<contact>	Sets contact person information.	M
		frame	<frame>	Sets the system frame number.	M
		hostname	<hostname>	Sets the system name.	M

Table 185 sys Commands (continued)

COMMAND				DESCRIPTION	P
		location	<location>	Sets the geographic location of the system.	M
		show		Displays general system and MSC1000G information.	L
	monitor	set	<slot> <volt|temp|fan|cup> <index> <high-limit> <low-limit>	Sets the hardware monitor threshold settings.	M
		show	<slot>	Displays the hardware monitor threshold settings of a slot.	L
	multilogin	disable		Turns off multiple concurrent logins.	M
		enable		Turns on multiple concurrent logins.	M
		show		Displays the multiple login setting.	L
	reboot			Restarts the system.	H
		[show]		Displays the reboot schedule.	H
		<sec>		Sets the number of seconds (1~2147483647) before the system reboots. If there is no time specified, the system reboots immediately.	H
		[cancel]		Aborts the scheduled system rebooting.	H
	server	enable	telnet|ssh|ftp|web|icmp|snmp	Turns on service access to the switch.	M
		disable	telnet|ssh|ftp|web|icmp|snmp	Turns off service access to the switch.	M
		port	telnet|ftp|web|snmp|ssh <port>	Sets a port for a service.	M
		show		Displays service access control settings.	L
	snmp	getcommunity	<community>	Sets the SNMP GetRequest community.	M
		setcommunity	<community>	Sets the SNMP SetRequest community.	M
		show		Displays SNMP settings.	L
		trapcommunity	<community>	Sets the SNMP Trap community.	M
		trapdst	<index> <destination> [<port>] [v1|v2c|v3] [<name>]	Sets the IP addresses and listening ports for up to four SNMP trap server IP addresses and listening ports. Set 0.0.0.0 to not send any SNMP traps. <name> = username to be included in trap packets. Only applicable for V3.	M
		user	<name> noauth|auth|priv md5|sha des|aes	Sets SNMPv3 user name and security settings. noauth = disables user authentication and data encryption. auth = enables user authentication. pri = enables user authentication and data encryption. md5|sha = authentication method. des|aes = encryption method.	M

Table 185 sys Commands (continued)

COMMAND				DESCRIPTION	P
		version	v2c|v3|v3v2c	Sets the system to use the specified SNMP version and access. v2c = SNMPv2 read/write v3 = SNMPv3 read/write v3v2c = SNMPv3 read/write and SNMPv2 read-only.	M
	syslog	disable		Turns off syslog logging.	M
		enable		Turns on syslog logging.	M
		server	<fac> <ip>	Sets the log facility (local1~local7) to log the syslog messages to a specific file in the syslog server. See your syslog program's documentation for details. Sets the syslog server IP address.	M
		show		Displays the syslog settings.	L
	time	set	<hh> [<mm> [<ss>]]	Sets the system time.	M
		show		Displays the current system time.	L
	timeserver	set	none	Clears the time server settings.	M
			daytime <ip> [sync] or time|ntp <ip> <utc[<+|->0100~1200]> [sync]	Sets the time service protocol and IP address of a time server. [sync] = Gets the time and date.	M
		show		Displays the time server settings.	L
		sync		Gets the time and date from a predefined time server.	M
	user	auth	<mode>	Select which database the switch uses to authenticate a user. 1= local, 2 = radius, 3 = local then radius.	H
		delete	<name>	Removes a user account.	H
		disable	<name>	Stops a user from logging in.	H
		enable	<name>	Allows a user to log in.	H
		online		Displays information about online users that are logged into the switch. * denotes your session.	L

Table 185 sys Commands (continued)

COMMAND				DESCRIPTION	P
		server	<ip> <port> <secret> [high|middle|low|deny]	Sets a RADIUS server's IP address and port number and the password to access the server. low = assigns the login accounts a low privilege level if the received service type is "login". medium = assigns the login accounts a medium privilege level if the received service type is "nas-prompt". high = assign the login accounts a high privilege level if the received service type is "admin". deny = block access from this login account if no service type is received.	H
		set	<username> <password> high|middle|low	Sets a user account and its level of access privileges.	H
		show		Displays authentication settings and user accounts.	L
	version			Displays the MSC1000G's general information such as the model name and firmware version.	L

31.3 sys Commands

Use these commands for system management and maintenance.

31.3.1 sys version Command

Syntax:

```
sys version
```

This command displays general information about the MSC1000G such as the model name and firmware version. This is an example.

```
ras> sys version

[master card version info]
product model   : MSC1000G
system up time  :    1:00:13:39
f/w version     : V3.70(LU.0) | 11/29/2006
bootbase version: VLU1.02 | 04/01/2005
database version : 09:16:57 2006/12/14
```

31.3.2 sys baud set Command

Syntax:

```
sys baud set 9600|19200|38400|57600|115200
```

This command sets the console port speed in bps.

The following example sets the console port speed to 115200 bps.

```
ras>  sys baud set 115200
```

31.3.3 sys baud show Command

Syntax:

```
sys baud show
```

This command displays the console port speed. This is an example.

```
ras> sys baud show
current baud rate is: 115200
ras>
```

31.3.4 sys client set Command

Syntax:

```
sys client set <index> <start-ip> <end-ip> [telnet] [ftp] [web] [icmp] [ssh]
[snmp]
```

This command configures a secured client entry consisting of an IP address range of trusted computers that may manage the IES-5000 and the services that they can use.[4]

The following example creates a client set for IP addresses 192.138.1.7 to 192.168.1.35 to use FTP to manage the MSC1000G.

```
ras> sys client set 1 192.168.1.7 192.168.1.35 ftp
```

31.3.5 sys client enable Command

Syntax:

```
sys client enable <index>
```

This command turns on a secured client set.

The following example turns on secured client set 1.

```
ras> sys client enable 1
```

31.3.6 sys client disable Command

Syntax:

```
sys client disable <index>
```

This command turns off a secured client set.

4. Web-based management was not available at the time of writing.

The following example turns off secured client set 1.

```
ras> sys client disable 1
```

31.3.7 sys client show Command

Syntax:

```
sys client show
```

This command displays the secured client settings. These are the IP addresses of trusted computers that can manage the MSC1000G and the services that they can use.

An example is shown next. A “V” in a column means that the secured client set is activated or the services can be used for managing the MSC1000G.

```
ras> sys client show

secured client:
idx enable start ip        end ip          telnet ftp web icmp ssh snmp
--- ------ --------------- --------------- ------ --- --- ---- --- ----
  1   yes  0.0.0.0         0.0.0.0            V    V   V    V   V    V
  2   no   0.0.0.0         0.0.0.0            -    -   -    -   -    -
  3   no   0.0.0.0         0.0.0.0            -    -   -    -   -    -
  4   no   0.0.0.0         0.0.0.0            -    -   -    -   -    -
ras>
```

31.3.8 sys time show Command

Syntax:

```
sys time show
```

This command displays the system’s current time. An example is shown next.

```
ras> sys time show
current time is 17:57:01
ras>
```

31.3.9 sys time set Command

Syntax:

```
sys time set <hh> [<mm> [<ss>]]
```

This command sets the system’s time. An example is shown next.

```
ras> sys time set 10 01 45
```

31.3.10 sys date show Command

Syntax:

```
sys date show
```

This command displays the system's current date. An example is shown next.

```
ras> sys date show
current date is Wed 2006/01/25
ras>
```

31.3.11 sys date set Command

Syntax:

```
sys date set <yyyy> <mm> <dd>
```

This command sets the system's date. An example is shown next.

```
ras> sys date set 2006 01 27
```

31.3.12 sys timeserver show Command

Syntax:

```
sys timeserver show
```

This command displays the system's time server settings. An example is shown next.

```
ras> sys timeserver show
protocol: none
server  : 0.0.0.0
timezone: utc
ras>
```

31.3.13 sys timeserver set Command

Syntax:

```
sys timeserver none
sys timeserver daytime <ip> [sync]
sys timeserver time|ntp <ip> <utc[<+|->0100~1200]> [sync]
```

where

`none`	=	Sets the system to not use a time server.
`daytime`	=	The Daytime time service protocol (RFC 867). When you select this format, the switch displays the day, month, year and time with no time zone adjustment. When you use this format it is recommended that you use a Daytime timeserver within your geographical time zone.

time|ntp	=	The time service protocol. <time> Time (RFC 868) format displays a 4-byte integer giving the total number of seconds since 1970/1/1 at 0:0:0. <ntp> NTP Network Time Protocol (RFC 1305) is similar to Time (RFC 868).
<ip>	=	The IP address of the time server.
<utc[<+|-> 0100~1200]>	=	The time difference between UTC (Universal Time Coordinated, formerly known as GMT, Greenwich Mean Time) and your time zone.
[sync]	=	This sets the system to synchronize with the time server.

This command sets the MSC1000G to use a time server.

The following example sets the MSC1000G to use NTP protocol to access a time server at IP address 140.112.2.189 and sets the MSC1000G's time zone to eight hours ahead of UTC. It also has the system synchronize the time with the time server.

```
ras> sys timeserver set ntp 140.112.2.189 utc +0800 sync
sync with time server...success
ras>
```

31.3.14 sys timeserver sync Command

Syntax:

```
sys timeserver sync
```

This command has the MSC1000G get the time and date from the time server. An example is shown next.

```
ras> sys timeserver sync
sync with time server...success
ras>
```

31.3.15 sys info chassis Command

Syntax:

```
sys info chassis <chassis>
```

where

<chassis>	=	The chassis number (an integer from 1 to 64). The chassis number helps to keep track of this individual unit in a multiple unit application.

This command sets the system chassis number.

The following example sets the system's chassis number to 3.

```
ras> sys info chassis 3
```

31.3.16 sys info contact Command

Syntax:

```
sys info contact <contact>
```

where

<contact>	=	The name (up to 31 characters) and contact information of the person in charge of this device.

This command sets the system contact person information.

The following example sets Bob_ext1234 as the system's contact person information.

```
ras> sys info contact Bob_ext1234
```

31.3.17 sys info frame Command

Syntax:

```
sys info frame <frame>
```

where

<frame>	=	Number (an integer from 1 to 65535) of the frame (rack) where the system is installed.

This command sets the system's frame number.

The following example sets 12345 as the system's frame number.

```
ras> sys info frame 12345
```

31.3.18 sys info hostname Command

Syntax:

```
sys info hostname <hostname>
```

where

<hostname>	=	A descriptive name for identification purposes. This name can be up to 30 alphanumeric characters long.

This command sets the system name.

The following example sets “OurSystem” as the system’s name.

```
ras> sys info hostname OurSystem
```

31.3.19 sys info location Command

Syntax:

```
sys info location <location>
```

where

<location> = The geographic location (up to 31 characters) of your device.

This command sets the geographic location of the system.

The following example sets Taiwan as the system’s geographic location.

```
ras> sys info location Taiwan
```

31.3.20 sys info show Command

Syntax:

```
sys info show
```

This command shows general system information, such as the RAS code, firmware version, system uptime and bootbase version. An example is shown next.

```
ras> sys info show

[system info]
hostname        :
location        :
contact         :
frame           :
chassis         :

[master card version info]
product model   : MSC1000G
system up time  : 01:28:29
f/w version     : V3.70(AIN.0)b6 | 11/16/2006
bootbase version: VAIN(1.02) | 07/25/2006
database version : 18:28:38 2006/11/13ras>
```

31.3.21 sys monitor set Command

Syntax:

```
sys monitor set <slot> volt|temp|fan|cpu <index> <high-limit> <low-limit>
```

where

`<slot>`	=	The main chassis slot where the card is located. Use the slot number of the MSC1000G when you configure the fan limits.
`volt|temp|fan|cpu`	=	`voltage` = Set the voltage tolerance range. `temp` = Set the temperature tolerance range. `fan` = Set the rotations per minute (RPM) tolerance range for a fan. `cpu` = Set the threshold for CPU usage.
`<index>`	=	The index number of the sensor. The power supply for each voltage has a sensor that is capable of detecting and reporting if the voltage falls out of the tolerance range. The card voltage sensors are as follows. MSC1000G: 1 = 2.5 V, 2 = 1.25 V, 3 = 3.3 V, 4 = 1.3 V, 5 = 15 V ADSL line card: 1 = 1.2 V, 2 = 1.8 V, 3 = 3.3 V, 4 = 20.5 V SHDSL line card: 1 = 1.8 V, 2 = 3.3 V, 3 = 15.0 V The management switch card has temperature sensors that are capable of detecting and reporting if the temperature rises above the threshold. Each card has three temperature sensors (1~3). Each fan has a sensor that is capable of detecting and reporting if the fan speed falls below the threshold of 2000 RPM. The system has six fans (1~6).

<high-limit>	=	A sensor's maximum voltage, temperature or fan RPM limit. The maximum voltage for each voltage sensor must be within the following ranges. Measured in millivolts (mV). MSC1000G: 1 = 2575~2750, 2 = 1287~1375, 3 = 3399~3630, 4 = 1339~1430, 5 = 15450~16500 ADSL line card: 1 = 1236~1320, 2 = 1854~1980, 3 = 3399~3630, 4 = 21115~22550 SHDSL line card 1 = 1854~1980, 2 = 3399~3630, 3 = 15450~16500 The maximum temperature for each temperature sensor must be within 50~100 (degrees centigrade). The maximum RPM for each fan must be within 1000~8000.
<low-limit>	=	A sensor's minimum voltage, temperature or fan RPM limit. The minimum voltage for each voltage sensor must be within the following ranges. Measured in millivolts (mV). MSC1000G:1= 2250~2425, 2 = 1125~1212, 3 = 2970~3201, 4 = 1170~1261, 5 = 13500~14550. ADSL line card: 1= 1080~1164, 2 = 1620~1746, 3 = 2970~3201, 4 = 18450~19885 SHDSL line card: 1 = 1620~1746, 2 = 2970~3201, 3 = 13500~14550 The minimum temperature for each temperature sensor must be within -50~10 (degrees centigrade). The minimum RPM for each fan must be within 1000~8000.

This commands sets the hardware monitor high and low thresholds.

The following example sets fan 1's maximum RPM threshold to 7500 and minimum RPM threshold to 5000. The MSC1000G is in slot 2.

```
ras> sys monitor set 2 fan 1 7500 5000
```

31.3.22 sys monitor show command

Syntax:

```
sys monitor show <slot>
```

where

<slot>	=	The main chassis slot where the card is located. The fan statistics are included with the MSC1000G statistics.

This command displays the hardware monitor's statistics.

The following example shows the MSC1000G statistics.

```
ras> sys monitor show 2
'*' indicates a current alarm
voltage:
idx  volt             current  nominal  high_lmt low_lmt
---  ---------------- -------- -------- -------- --------
  1  2.5V                2.582    2.500    2.700    2.300
  2  1.25V               1.236    1.250    1.350    1.150
  3  3.3V                3.338    3.300    3.564    3.036
  4  1.3V                1.341    1.300    1.404    1.196
  5  15V                15.159   15.000   16.200   13.800
temperature:
idx  temperature      current  high_lmt low_lmt
---  ---------------- -------- -------- --------
  1  Temp1              43.000   65.000  -10.000
  2  Temp2              48.750   65.000  -10.000
  3  Temp3              53.000   65.000  -10.000
fan:
idx  fan speed        current  high_lmt low_lmt
---  ---------------- -------- -------- --------
  1 *FAN1                    0     6500     2000
  2 *FAN2                    0     6500     2000
  3 *FAN3                    0     6500     2000
  4 *FAN4                    0     6500     2000
  5 *FAN5                    0     6500     2000
  6 *FAN6                    0     6500     2000
ras>
```

31.3.23 sys multilogin enable Command

Syntax:

```
sys multilogin enable
```

This command turns on multiple login. Multiple login allows multiple administrators to be logged into the system at the same time. The following table describes how many sessions can be used at the same time.

Table 186 Multiple Login Overview

Console Port	SSH	Telnet	Web (HTTP)	FTP/SFTP	SNMP	ICMP
One session.	SSH and Telnet share four sessions. SSH has priority. Multiple users can login using the same user name and password.		Three sessions (one session per user account)	One session	No limit	No limit

The following is an example.

```
ras> sys multilogin enable
```

31.3.24 sys multilogin disable Command

Syntax:

```
sys multilogin disable
```

This command turns off multiple login. The following is an example.

```
ras> sys multilogin disable
```

31.3.25 sys multilogin show Command

Syntax:

```
sys multilogin show
```

This command displays the multiple login setting. The following is an example.

```
ras> sys multilogin show
multilogin is enabled
ras>
```

31.3.26 sys reboot Command

Syntax:

```
sys reboot [show] <sec> [cancel]
```

where

`[show]`	=	Displays the reboot schedule.
`<sec>`	=	The number of seconds (1~2147483647) before the system reboots. If there is no time specified, the system reboots immediately.
`[cancel]`	=	Aborts the scheduled system rebooting.

This command restarts the system.

The following example shows the administrator at IP address 172.23.19.11 ordering a reboot to occur after 1200 seconds, displaying the reboot `schedule and then canceling the reboot`.

```
ras> sys reboot 1200

telnet-1(172.23.19.11) has initiated reboot, system reboot in 1200 seconds!

ras> sys reboot show

issued by                  remaining time issue time
-------------------------- -------------- ------------------------
telnet-1(172.23.19.11)               1196 Wed Jun  8 15:26:54 2005

ras> sys reboot cancel

telnet-1(172.23.19.11) has cancelled system reboot!
```

31.3.27 sys server port Command

Syntax:

```
sys server port telnet|ftp|web|snmp|ssh <port>
```

This command changes the port for a service on the MSC1000G.

The following example sets the MSC1000G to use port 24 for Telnet sessions.

```
ras> sys server port telnet 24
```

31.3.28 sys server disable Command

Syntax:

```
sys server enable telnet|ftp|web|snmp|ssh
```

This command turns off access for a service on the MSC1000G.

The following example sets the MSC1000G to block Telnet sessions.

```
ras> sys server disable telnet
```

31.3.29 sys server enable Command

Syntax:

```
sys server enable telnet|ftp|web|snmp|ssh
```

This command turns on access for a service on the MSC1000G.

The following example sets the MSC1000G to allow Telnet sessions.

```
ras> sys server enable telnet
```

31.3.30 sys server show Command

Syntax:

```
sys server show
```

This command displays the MSC1000G's service access control settings. The following is an example.

```
ras> sys server show

server status  port
------ ------ -----
telnet   V       23
ftp      V       21
web      V       80
icmp     V       -
snmp     V      161
ssh      V       22
ras>
```

31.4 sys snmp Commands

Use these commands to configure the MSC1000G's SNMP settings.

31.4.1 sys snmp getcommunity Command

Syntax:

```
sys snmp getcommunity <community>
```

where

`<community>` = The password for the incoming Get- and GetNext- requests from the management station.

Enter this command with the community to set the password.

The following example sets the password for incoming Get- and GetNext requests to "Get123".

```
ras> sys snmp getcommunity Get123
```

31.4.2 sys snmp setcommunity Command

Syntax:

```
sys snmp setcommunity <community>
```

where

`<community>` = The password for the incoming Set- requests from the management station.

Enter this command with the community to set the password.

The following example sets the password for incoming Set- requests to "Set123".

```
ras> sys snmp setcommunity Set123
```

31.4.3 sys snmp trapcommunity Command

Syntax:

```
sys snmp trapcommunity <community>
```

where

`<community>` = The password sent with each trap to the SNMP manager.

Enter this command with the community to set the password.

The following example sets the MSC1000G to send a password of “public” with the traps it sends to the SNMP manager.

```
ras> sys snmp trapcommunity public
```

31.4.4 sys snmp trapdst Command

Syntax:

```
sys snmp trapdst <index> <ip> [<port>] [v1|v2|v3] [<name>]
```

where

`<index>`	=	The number of the trap server (1~4).
`<ip>`	=	The IP address of the trap server.
`[<port>]`	=	The port number upon which the trap server listens for SNMP traps. The MSC1000G uses the default of 162 if you do not specify a trap port.
`[v1|v2c|v3]`	=	Format of the SNMP trap PDU (Protocol Data Unit) to be sent. The default is `v2c`.
`[<name>]`	=	The username to be included in the trap PDUs. This is only applicable for SNMPv3.

Use this command to specify the IP address (and port number) of a trap server to which the MSC1000G sends SNMP traps. If you leave the trap destination set to 0.0.0.0 (default), the MSC1000G will not send any SNMP traps.

The following example sets the MSC1000G to send traps to a server at IP address 192.168.1.36. The traps are sent using SNMP v3 and include the user name `example`.

```
ras> sys snmp trapdst 1 192.168.1.36 v3 example
```

31.4.5 sys snmp show Command

Syntax:

```
sys snmp show
```

This command displays the current SNMP get community, set community, trap community and trap destination settings. The following is an example.

```
ras> sys snmp show

[community]
get community : Get123
set community : Set123
trap community: public

[trap destination]
1: 192.168.1.36:162
2: 0.0.0.0:0
3: 0.0.0.0:0
4: 0.0.0.0:0
ras>
```

31.4.6 sys snmp user Command

Syntax:

`sys snmp user <name> noauth|auth|priv md5|sha des|aes`

where

`<name>`	=	User name for SNMPv3 authentication.
`noauth`	=	Disables (`noauth`) SNMPv3 user authentication and encryption for SNMP communication.
`auth`	=	Enables SNMPv3 user authentication.
`priv`	=	Enables SNMPv3 user authentication and encryption for SNMP communication using a private key generated from the password.
`md5|sha`	=	Authentication method. MD5 (Message Digest 5) produces a 128-bit digest to authenticate packet data. SHA (Secure Hash Algorithm) produces a 160-bit digest to authenticate packet data. Use `md5` for minimal security and `sha` for maximum security.
`des|aes`	=	Encryption method. Data Encryption Standard (DES) is a widely used method of data encryption using a secret key. DES applies a 56-bit key to each 64-bit block of data. Advanced Encryption Standard (AES) is a newer method of data encryption that also uses a secret key. AES is more secure than DES.

This command sets the user authentication and data encryption settings for SNMPv3. The following example enables SNMPv3 SHA user authentication with AES data encryption.

```
ras> sys snmp user example auth sha aes
```

31.4.7 sys snmp version Command

Syntax:

```
sys snmp version v2c|v3|v3v2c
```

where

`v2c|v3|v3v2c`	=	Sets the SNMP version and access mode. `v2c` = SNMPv2 read/write `v3` = SNMPv3 read/write with additional user authentication and data encryption options. `v3v2c` = SNMPv3 read/write and SNMPv2 read-only.

This command sets the system to use the specified SNMP version and access mode.

The following example configures the system to use SNMPv3 with read-only access for SNMPv2.

```
ras> sys snmp version v3v2c
```

31.5 sys syslog Commands

Use these commands to configure the MSC1000G's syslog settings.

31.5.1 sys syslog server Command

Syntax:

```
sys syslog server <fac> <ip>
```

where

`<fac>`	=	Sets the log facility (local1~local7) to log the syslog messages to a specific file in the syslog server. See your syslog program's documentation for details. Sets the syslog server IP address.
`<ip>`	=	The IP address of the syslog server.

This command sets the syslog server's IP address and log facility.

The following example sets a syslog server log facility of 3 and IP address of 192.168.1.43.

```
ras> sys syslog server local3 192.168.1.43
```

31.5.2 sys syslog enable Command

Syntax:

```
sys syslog enable
```

This command sets the MSC1000G to send logs to an external syslog server. An example is shown next.

```
ras> sys syslog enable
```

31.5.3 sys syslog disable Command

Syntax:

```
sys syslog disable
```

This command sets the MSC1000G to not send logs to an external syslog server. An example is shown next.

```
ras> sys syslog disable
```

31.5.4 sys syslog show Command

Syntax:

```
sys syslog show
```

This command displays the syslog settings. An example is shown next.

```
ras> sys syslog show
status   : disabled
facility server ip
-------- ---------------
local1   0.0.0.0
local2   0.0.0.0
local3   192.168.1.43
local4   0.0.0.0
local5   0.0.0.0
local6   0.0.0.0
local7   0.0.0.0
ras>
```

31.6 sys user Commands

Use these commands to configure the MSC1000G's administrator account and authentication settings.

31.6.1 sys user auth Command

Syntax:

```
sys user auth <mode>
```

where

<mode>	=	Sets which database the switch uses to authenticate a user. 4:tacacs+, 5:local then tacacs+ 1 = local 2 = radius 3 = local first and then radius 4 = TACACS+ 5 = local first then TACACS+

This command sets which database the MSC1000G uses to authenticate a user.

The following example sets the MSC1000G to check a user's username and password against the local database.

```
ras> sys user auth 1
```

31.6.2 sys user server Command

Syntax:

```
sys user server <ip> <port> <secret> [high|middle|low|deny]
```

where

<ip>	=	The IP address of the RADIUS server.
<port>	=	The RADIUS server's listening port number. The MSC1000G uses the default of 1812 if you do not specify a port.
<secret>	=	The password for the RADIUS server.
[high|middle|low|deny]	=	The default account privilege assignment if the RADIUS server does not send the service type information after user authentication is successful. low = assigns the login accounts a low privilege level. medium = assigns the login accounts a medium privilege level. high = assign the login accounts a high privilege level. deny = block access from this login account.

This command sets a RADIUS server's IP address, port number and the password to access the server. This command also sets the default account privilege assignment if the RADIUS server does not send the service type information after user authentication is successful.

You will be blocked access to the system for remote management if you enter `deny` and the system uses only RADIUS authentication with no system type information. In this case, you can only access and manage the device through the console port.

The following example sets a RADIUS server IP address of 192.168.1.77, port number of 1813 and password of "pwd1234". The account is assigned a `medium` privilege if no service type information is received from the RADIUS server.

```
ras> sys user server 192.168.1.77 1813 pwd1234 medium
```

31.6.3 sys user set Command

Syntax:

```
sys user set <username> <password> high|middle|low
```

where

`<username>`	=	The user name for the account
`<password>`	=	The password for the account.
`high|middle|low`	=	The user account's level of access privileges. `high` = Can use all commands. `middle` = Can use middle or low privilege commands. Middle privilege commands include things like general feature configuration. `low` = Can only use low privilege commands. Low privilege commands are read only and consist of displaying feature settings or configuration.

This command sets a local user administrator account and its level of access privileges.

The following example sets an administrator account with a user name of "bob" password of "smith" and middle level access privileges.

```
ras> sys user set bob smith middle
```

31.6.4 sys user delete Command

Syntax:

```
sys user delete <name>
```

where

`<name>`	=	The user name for the account

This command removes a local user administrator account.

The following example removes the “fred” administrator account.

```
ras> sys user delete fred
```

31.6.5 sys user enable Command

Syntax:

```
sys user enable <name>
```

where

`<name>` = The user name for the account

This command turns on an administrator account.

The following example turns on the “bob” administrator account.

```
ras> sys user enable bob
```

31.6.6 sys user disable Command

Syntax:

```
sys user disable <name>
```

where

`<name>` = The user name for the account

This command turns off an administrator account.

The following example turns off the “bob” administrator account.

```
ras> sys user disable bob
```

31.6.7 sys user show Command

Syntax:

```
sys user show
```

This command displays authentication settings and user accounts. The following is an example.

```
ras> sys user show
auth mode: local then radius
radius server ip: 0.0.0.0  port: 1812  secret: 1234
index en name             privilege
----- -- ---------------- ---------
    1 V  admin              high
ras>
```

31.6.8 sys user online Command

Syntax:

```
sys user online
```

This command displays information administrators that are logged into the switch.

The following is an example. * denotes your session.

```
ras> sys user online
[session info ('*' denotes your session)]
session    user             remote ip       login time
---------- ---------------- --------------- -------------------
*telnet    admin            172.23.19.11    13:08:27 2005/06/09
ras>
```

32

vlan Commands

This chapter shows you how to use the `vlan` commands.

32.1 vlan Commands Overview

The `vlan` commands are for static VLAN management.

32.2 vlan Commands Summary

The following table lists the `vlan` commands. The **P** column on the right indicates the administrator privilege level needed to use the command (**H** for high, **M** for middle or **L** for low).

Table 187 vlan Commands

COMMAND				DESCRIPTION	P
`vlan`					
	`delete`	`<vid>`		Removes a static VLAN.	M
	`disable`	`<vid>`		Turns off a VLAN.	M
	`enable`	`<vid>`		Turns on a VLAN.	M
	`name`	`<vid> <name>`		Sets the name of a VLAN.	M
	`set`	`<vid> <giga-port> fix|forbid|normal tag|untag`		Adds a static VLAN.	M
	`show`	`[<vid>]|[<start-vid> <end-vid>]`		Displays all VLANs' settings, a specified VLAN's settings or a range of static VLANs' settings.	L

32.3 vlan Commands

Use the `vlan` commands to configure static VLANs (SVLANs).

32.3.1 vlan delete Command

Syntax:

```
vlan delete <vid>
```

This command removes a static VLAN.

The following example removes static VLAN entry 27.

```
ras> vlan delete 27
```

32.3.2 vlan disable Command

Syntax:

```
vlan disable <vid>
```

This command turns off the static VLAN.

The following example turns off static VLAN entry 27.

```
ras> vlan disable 27
```

32.3.3 vlan enable Command

Syntax:

```
vlan enable <vid>
```

This command turns on the static VLAN.

The following example turns on static VLAN entry 27.

```
ras> vlan enable 27
```

32.3.4 vlan name Command

Syntax:

```
vlan name <vid> <name>
```

where

`<vid>`	=	The VLAN ID [1 – 4094].
`<name>`	=	A name to identify the SVLAN entry.

This command sets the name for an entry in the static VLAN table.

The following example names static VLAN entry 27 “sub1”.

```
ras> vlan name 27 sub1
```

32.3.5 vlan set Command

Syntax:

```
vlan set <vid> <giga-port> <fix|forbid|normal> <tag|untag>
```

where

<vid>	=	The VLAN ID [1 – 4094].
<giga-port>	=	This represents Gigabit Ethernet uplink ports, subtending ports or all ports. Use sub1|sub2|up1|up2|all if trunking is not enabled. Use sub|up|all if trunking is enabled.
fix|forbid|normal	=	fix = Makes the port a permanent member of this VLAN group. forbid = Prohibits the port from joining this VLAN group. normal = The port can dynamically join this VLAN group using GVRP. This is available for the Ethernet ports. You cannot change a port from the fixed state to another state if the port's PVID is set to this VLAN. The VLAN must have at least one port set to the fixed status if the VLAN is the CPU (management) VLAN.
tag|untag	=	tag = Add an IEEE 802.1Q tag to frames going out through this port(s). untag = Send frames out through this port(s) without an IEEE 802.1Q tag.

This command adds or modifies an entry in the static VLAN table.

The following example creates a static VLAN entry for VLAN 27 with the subtending 1 port as a fixed member and it tags all frames going out through the port.

```
ras> vlan set 27 sub1 fix tag
```

32.3.6 vlan show Command

Syntax:

```
vlan show [<vid>]|[<start-vid> <end-vid>]
```

where

[<vid>]|[<start-vid> <end-vid>]	=	You can specify a single VID: <1>, or a range of VIDs: <6> <10>.

This command shows information about the specified VLAN's settings. It displays the settings of all of the VLANs if you do not specify a VLAN.

The following example shows the settings for all VIDs.

```
ras> vlan show
                                        1         2         3         4
idx  name       vid  en  slot
12345678901234567890123456789012345678901234567890123456789012345678
---- ---------- ---- --- ---- ----------------------------------------------
--
   1 1             1  V     2 FFFF
                              UUUU
                           3 XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
                           4 XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
                           5 FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF
                           6 XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
                           7 FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF
                           8 XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
                           9 FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF
                          10 XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

    Press any key to continue, 'e' to exit
```

33

Firmware and Configuration File Maintenance

This chapter tells you how to upload a new firmware file and how to upload and download configuration files.

33.1 Firmware and Configuration File Maintenance Overview

The MSC1000G's built-in FTP (and SFTP) servers allow you to use any FTP (or SFTP) client (for example, ftp.exe in Windows) to upgrade MSC1000G or MSC1000G firmware or configuration files. The firmware or configuration file upgrade is done during operation (run-time).

Do not interrupt the file transfer process, as it may permanently damage your MSC1000G.

When you upload the MSC1000G's firmware, the MSC1000G automatically restarts when the upgrade process is complete.

33.2 Filename Conventions

The configuration file contains the whole system settings in the menus such as password, IP address, VLANs and so on. The configuration file is called "config.dat" when you obtain it from ZyXEL and "config-0" in the system.

ZyNOS (ZyXEL Network Operating System) is the system firmware. It has a "bin" filename extension when you get it from ZyXEL and is called "ras" in the system. With many FTP and SFTP clients, the filenames are similar to those shown next.

```
ftp> put firmware.bin ras
```

This is a sample from a FTP session to transfer the computer file `firmware.bin` to the MSC1000G.

```
ftp> get config-0 config.dat
```

This is a sample from a FTP session to transfer the MSC1000G's current configuration file (including the configuration files of all the line cards) to the computer file `config.dat`.

If your FTP or SFTP client does not allow you to have a destination filename different than the source, you will need to rename them as the MSC1000G only recognizes "config-0" and "ras". Be sure you keep unaltered copies of the files for later use.

The following table is a summary. Please note that the internal filename refers to the filename on the MSC1000G and the external filename refers to the filename not on the MSC1000G, that is, on your computer, local network or FTP site and so the name (but not the extension) may vary. After uploading new firmware, use the `sys version` command to confirm that you have uploaded the correct firmware version.

Table 188 File Name Conventions

FILE TYPE	INTERNAL NAME	EXTERNAL NAME	DESCRIPTION
Configuration File	config-0	*.dat	This is the configuration filename for the MSC1000G.
Firmware	ras	*.bin	This is the generic name for the ZyNOS firmware on the MSC1000G.

33.3 Editable Configuration File

The configuration file can be downloaded as a plain-text (English keyboard characters) file. Edits to the configuration can be made to this file before it is uploaded again to the IES-5000.

You can change the ".dat" file to a ".txt" file and still upload it to the IES-5000 as long as you rename it to "config-0" when you upload it to the IES-5000.

33.3.1 Editable Configuration File Backup

Configure your system, and then use FTP or SFTP to backup the plain-text configuration file onto your computer. Do the following to backup the configuration file:

Use an FTP or SFTP client to connect to the IES-5000.

```
C:\> ftp <IES-5000 IP address>
```

Type your user name and press [ENTER].

```
User (172.23.15.86:(none)): admin
```

Enter the management password (1234 by default).

```
Password: 1234
230 Logged in
```

Use `get` to transfer the configuration file to the computer. The configuration file on the system (that you want to backup to the computer) is named `config-0`.

```
ftp> get config-0 config.dat
```

Quit FTP.

```
ftp> quit
```

33.3.2 Edit Configuration File

Open the `config.dat` file via a text editor (see the following example) and edit to the desired configuration.

Ensure that any changes you make to the commands in the configuration file correspond to the commands documented in this User's Guide. The system user password is encrypted and you cannot edit it in a text editor.

```
$$ system configuration file
[version]
1.00

$$ msc configuration
[confuser]
sys user auth 3
sys user set admin d4:88:dd:79:63:7c:78:11:87:92:cb:3b:c5:41:0c:21 high
sys user enable admin
sys user server 0.0.0.0 1812 1234
[confsyslog]
sys syslog disable
sys syslog server local1 0.0.0.0
sys syslog server local2 0.0.0.0
sys syslog server local3 0.0.0.0
sys syslog server local4 0.0.0.0
sys syslog server local5 0.0.0.0
sys syslog server local6 0.0.0.0
sys syslog server local7 0.0.0.0
[msc]
sys info hostname TGE1
sys snmp getcommunity public
sys snmp setcommunity public
sys snmp trapcommunity public
sys server port telnet 23
```

33.3.3 Editable Configuration File Upload

You can upload the configuration file by following the steps below.

Use an FTP or SFTP client to connect to the IES-5000.

```
C:\> ftp <IES-5000 IP address>
```

Type your user name and press [ENTER].

```
User (172.23.15.86:(none)): admin
```

Enter the management password (1234 by default).

```
Password: 1234
230 Logged in
ftp> put xxx.dat config-0
```

Quit FTP.

```
ftp> quit
```

Wait for the update to finish. The system restarts automatically.

33.4 Firmware File Upgrade

Use the following procedure to upload firmware to the management switch card, DSL line card or DSL line cards.

Use an FTP or SFTP client to connect to the management switch card.

```
C:\> ftp <IES-5000 IP address>
```

Type your user name and press [ENTER].

```
User (172.23.15.86:(none)): admin
```

Enter the management password (1234 by default).

```
Password: 1234
230 Logged in
```

Use the `ls` FTP command to list the files that you can work with on the IES-5000. The following is an example. Use entries from the list to transfer the firmware file to the management switch card, DSL line card or all of DSL line cards of a certain model.

```
ftp> ls
200 Port command okay
150 Opening data connection for LIST
--w--w--w-   1 owner    group         3570592 Jul 01 12:00 ras
-rw-rw-rw-   1 owner    group           16106 Jul 01 12:00 config-0
-r--r--r--   1 owner    group           47813 Jul 01 12:00 almhis
--w--w--w-   1 owner    group               0 Jul 01 12:00 fw-ALC1248G-51
--w--w--w-   1 owner    group               0 Jul 01 12:00 fw-ALC1248G-53
--w--w--w-   1 owner    group               0 Jul 01 12:00 fw-SLC1248G-22
--w--w--w-   1 owner    group               0 Jul 01 12:00 fw-VLC1224G-41
--w--w--w-   1 owner    group               0 Jul 01 12:00 fw-ALC1272G-51
--w--w--w-   1 owner    group               0 Jul 01 12:00 fw-3
--w--w--w-   1 owner    group               0 Jul 01 12:00 fw-4
--w--w--w-   1 owner    group               0 Jul 01 12:00 fw-5
--w--w--w-   1 owner    group               0 Jul 01 12:00 fw-6
--w--w--w-   1 owner    group               0 Jul 01 12:00 fw-7
--w--w--w-   1 owner    group               0 Jul 01 12:00 fw-8
--w--w--w-   1 owner    group               0 Jul 01 12:00 fw-9
--w--w--w-   1 owner    group               0 Jul 01 12:00 fw-10
226 File sent OK
ftp: 1096 bytes received in 0.19Seconds 5.86Kbytes/sec.
```

In this example, the firmware file on your computer (that you want to put onto a card or cards) is named `firmware.bin`.

- Use this command to transfer the firmware file to the management switch card that you are using (the internal firmware file is named `ras`).

```
ftp> put firmware.bin ras
```

- Use this command to transfer the firmware file to a DSL line card or the management switch card that you are not currently using. Use "fw-" followed by the number of the slot.

```
ftp> put firmware.bin fw-3
```

- Use this command to transfer the firmware file to all of the IES-5000 DSL line cards of the same type. Use "fw-" followed by ALC1248G-51, ALC1248G-53, ALC1272G-51, SLC1248G-22, or VLC1224G-41. The following example uploads firmware to all of the ALC1248G-51 line cards in the IES-5000.

```
ftp> put firmware.bin fw-ALC1248G-51
```

33.5 Configuration File Upgrade

Use an FTP or SFTP client to connect to the IES-5000.

```
C:\> ftp <IES-5000 IP address>
```

Type your user name and press [ENTER].

```
User (172.23.15.86:(none)): admin
```

Enter the management password (1234 by default).

```
Password: 1234
230 Logged in
```

Transfer the configuration file to the management switch card. The configuration file on your computer (that you want to put onto the management switch card) is named `config.dat`. The internal configuration file on the management switch card is named `config-0`.

```
ftp> put config.dat config-0
```

Quit FTP.

```
ftp> quit
```

Wait for the update to finish. The system restarts automatically.

PART IV
Troubleshooting

Troubleshooting (593)

34

Troubleshooting

This chapter offers some suggestions to solve problems you might encounter. The potential problems are divided into the following categories. See Appendix A on page 603 for default settings.

34.1 Power, Hardware Connections, and LEDs

The MSC1000G does not turn on. None of the LEDs turn on.

Make sure the MSC1000G is properly installed in the slot and the system power is properly connected and turned on.

Refer to the IES-5000 Series User's Guide for directions and safety warnings on installing the management switch card and power connections for the IES-5000.

The **ALM** LED is on.

An alarm has been detected on the MSC1000G, the Integrated Ethernet Switch fan or the **INPUT ALARM** terminals. Examples of an alarm on the MSC1000G are when the MSC1000G's voltage or temperature is outside of the normal range.

Check the logs to see the cause of the alarm. Take appropriate measures to remove the cause of the alarm. For example, you may need to change the fan module if the fans are not operating normally (see the IES-5000 Series User's Guide for directions).

One of the LEDs does not behave as expected.

1. Make sure you understand the normal behavior of the LED. See Section 2.2 on page 57.
2. Check the hardware connections. See Section 2.3 on page 58.
3. Inspect your cables for damage. Replace any damaged cables.
4. Turn the power off and on.
5. If the problem continues, contact the vendor.

A Gigabit Ethernet interface's LEDs are not on.

1. Make sure the interface is enabled.
2. Make sure that the interface's connection speed is set to match that of the port on the peer Ethernet device.
3. Check the copper or fiber optic Ethernet cable and connections between the interface and the Ethernet switch or router.
4. If the interface is an SFP slot, check the transceiver.
5. Make sure that the peer Ethernet device is functioning properly.
6. If the Ethernet cable and peer Ethernet device are both OK and the LEDs stay off, there may be a problem with the interface. Contact the distributor.

A SFP slot's **LNK** LED turns on and off intermittently.

1. Check the copper or fiber optic Ethernet cable and connections between the uplink or subtending interface and the Ethernet switch or router.
2. Make sure that the peer Ethernet device is functioning properly.
3. If the Ethernet cable and peer Ethernet device are both OK and the **LNK** LED keeps turning off and on, there may be a problem with the port. Contact the distributor.

34.2 MSC1000G Access and Login

I forgot the IP address for the MSC1000G.

1. If you forgot the IP address of the in-band management port, try to log into the out-of-band management port. If you were using the out-of-band management port, try the in-band management port.
1. The default in-band IP address is **192.168.1.1**. The default out-of-band IP address is **192.168.0.1**
2. Use the console port to log in to the MSC1000G.

I forgot the password.

1. The default password is **1234**.
2. Contact customer support for how to reset your device to the factory defaults if you have forgotten the password.

I cannot see or access the **Login** screen in the web configurator.

1. Make sure you are using the correct IP address.
   - The default in-band IP address is **192.168.1.1**. The default out-of-band IP address is **192.168.0.1**
   - If you changed the IP address, use the new IP address.
   - If you changed the IP address and have forgotten it, see the troubleshooting suggestions for I forgot the IP address for the MSC1000G.
2. Check the hardware connections, and make sure the LEDs are behaving as expected. See IES-5000 Series User's Guide and Chapter 2 on page 57.
3. Make sure your Internet browser does not block pop-up windows and has JavaScripts and Java enabled.
4. Make sure your computer is in the same subnet as the MSC1000G. (If you know that there are routers between your computer and the MSC1000G, skip this step.)
5. Reset the device to its factory defaults, and try to access the MSC1000G with the default IP address. See Section 34.7 on page 598.
6. If the problem continues, contact the network administrator or vendor, or try one of the following.

- Try to access the MSC1000G using another service, such as Telnet. If you can access the MSC1000G, use the `sys client show`, `sys user show`, and `sys server show` commands to find out why the MSC1000G does not respond to HTTP.
- If you are using in-band management, try connecting to the out-of-band management port or the console port.

I can see the **Login** screen, but I cannot log in to the MSC1000G.

1. Make sure you have entered the user name and password correctly. The default user name is **admin**, and the default password is **1234**. These fields are case-sensitive, so make sure [Caps Lock] is not on.
2. Turn the system off and on.
3. If this does not work, you have to reset the device to its factory defaults. See Section 34.7 on page 598.

I cannot use FTP to upload / download the configuration file. / I cannot use FTP to upload new firmware.

See the troubleshooting suggestions for I cannot see or access the Login screen in the web configurator. Ignore the suggestions about your browser.

The SNMP manager server cannot get information from the MSC1000G.

1. Ping the MSC1000G from the SNMP server. If you cannot, check the cable, connections and IP configuration.
2. Check to see that the community (or trusted host) in the MSC1000G matches the SNMP server's community.
3. Make sure that your computer's IP address matches a configured trusted host IP address (if configured).

I cannot telnet into the MSC1000G.

1. Make sure that a telnet session(s) is not already operating. The MSC1000G only accepts one telnet session at a time (or a total of four Telnet and SSH sessions with multiple login enabled).
2. Make sure that your computer's IP address matches a configured secured client IP address (if configured). The MSC1000G immediately disconnects the telnet session if secured host IP addresses are configured and your computer's IP address does not match one of them.
3. Make sure that you have not disabled the Telnet service or changed the server port number that the MSC1000G uses for Telnet.
4. Ping the MSC1000G from your computer.
5. If you are able to ping the MSC1000G but are still unable to telnet, contact the distributor.
6. If you cannot ping the MSC1000G, check the cable, connections and IP configuration.
7. See the troubleshooting suggestions for I cannot see or access the Login screen in the web configurator. Ignore the suggestions about your browser.

I cannot use the console port to access the MSC1000G.

Make sure you use terminal emulation software with the correct settings (default VT100 terminal emulation, 9600 bps, No parity, 8 data bits, 1 stop bit, and no flow control).

34.3 Data Transmission

The Gigabit Ethernet interface's LED is on, but data cannot be transmitted.

1. Make sure that the port has the appropriate uplink or subtending mode setting.
2. Make sure that the IP settings are properly configured.
3. Check the VLAN configuration.
4. Ping the MSC1000G from a computer behind the peer Ethernet device.
5. If you cannot ping, check the Ethernet cable and connections between the uplink or subtending port and the Ethernet switch or router.

34.4 Redundant Management Switch Cards

I cannot get a redundant (second) management switch card to work as a standby.

1. Make sure that the management switch cards are in slots 1 and 2 of the IES-5000 main chassis. The two management switch cards must have the same types of uplink and subtending connections.
2. Make sure that the management switch cards both have firmware version V3.50(LU.1) or later. Earlier firmware versions do not support the use of a redundant management switch card.

34.5 Management Lockout

You could lock yourself (and all others) out from the MSC1000G by:

1. Misconfiguring the text configuration file.
2. Forgetting the password.

Be careful not to lock yourself and others out of the MSC1000G.

34.6 A Line Card Does Not Become Active

A line card is stuck in the inactive state.

It is normal for a line card to be in the inactive state when it is starting up or the firmware is being upgraded. If neither of these is the case, the line card may be malfunctioning. Try the following.

1. The MSC1000G can automatically restart a line card that it is managing. If the line card is unresponsive, use the `lcman reset` command to perform a hardware reset on the line card.
2. Try removing the line card from the slot and re-installing it.
3. If neither of these steps work, use the `lcman disable` command. Then connect to the line card's console port and recover the firmware. The procedure to recover the line card firmware is similar to the procedure for recovering the MSC1000G firmware (see Section 34.7.2 on page 599).
4. After you have recovered the line card's firmware, use the `lcman enable` command to turn the MSC1000G's management of the line card back on.

34.7 Resetting the Defaults

You can upload the factory-default configuration file to reset the MSC1000G to the default settings. This means that you will lose all previous configurations and the speed of the console port will be reset to the default of 9600 bps with 8 data bit, no parity, one stop bit and flow control set to none. The user name and password will also be reset to "admin" and "1234". The default in-band IP address is 192.168.1.1. The default out-of-band IP address is 192.168.0.1.

If you forget your password or cannot access the MSC1000G, contact customer support for how to reset your device to the factory defaults.

34.7.1 Resetting the Defaults Via CLI Command

If you know the password, you can reload the factory-default configuration file via Command Line Interface (CLI) command. Use the following procedure.

1. Connect to the console port using a computer with terminal emulation software. See the chapter on hardware connections for details.
2. Enter your password.
3. Type `config default`.
4. Type `y` at the question "`reset configuration to factory default needs system restart! proceed(y/n)? >)?`"
5. After restarting, the MSC1000G is re-initialized with a default configuration file the default user name of "admin" and password of "1234".

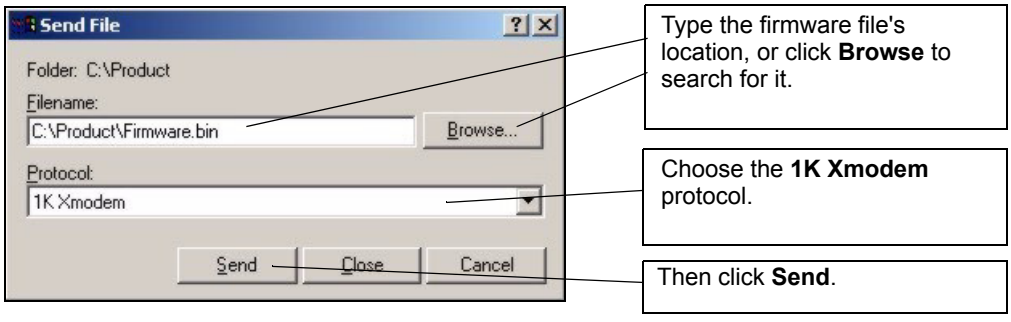
34.7.2 Recovering the Firmware

Usually you should use FTP or the console port to upload the MSC1000G's firmware. If the MSC1000G will not start up, the firmware may be lost or corrupted. Use the following procedure to upload firmware to the MSC1000G only when you are unable to use another method to upload firmware.

This procedure is for emergency situations only.

1. Obtain the firmware file, unzip it and save it in a folder on your computer.
2. Connect your computer to the console port and use terminal emulation software configured to the following parameters:
   - VT100 terminal emulation
   - No parity, 8 data bits, 1 stop bit
   - 9600 bps
   - No flow control
3. Turn off the IES-5000 and turn it back on to restart it and begin a session.
4. When you see the `Press any key to enter Debug Mode within 3 seconds` message, press a key to enter debug mode.
5. Type `atba5` after the `Enter Debug Mode` message (this changes the console port speed to 115200 bps).
6. Change the configuration of your terminal emulation software to use 115200 bps and reconnect to the MSC1000G.
7. Type `atur` after the `Enter Debug Mode` message.
8. Wait for the `Starting XMODEM upload` message before activating XMODEM upload on your terminal.
9. This is an example Xmodem configuration upload using HyperTerminal. Click **Transfer**, then **Send File** to display the following screen.

Figure 193 Example Xmodem Upload



10. After a successful firmware upload, type `atgo` to restart the MSC1000G. The console port speed automatically changes back to 9600 bps when the MSC1000G restarts.

PART V
Appendices and Index

Product Specifications (603)
Virtual Circuit Topology (613)
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A

Product Specifications

This appendix gives details about the IES-5000 default settings and MSC1000G hardware and features.

IES-5000 Default Settings

This table lists major default settings.

Table 189 Default Settings

Default In-band IP Address	192.168.1.1	
Default In-band Subnet Mask	255.255.255.0 (24 bits)	
Default Out-of-band IP Address	192.168.0.1	
Default Out-of-band Subnet Mask	255.255.255.0 (24 bits)	
Default User Name	admin	
Default Password	1234	
Default Console Port Settings	VT100 terminal emulation, 9600 bps, No parity, 8 data bits, 1 stop bit, and no flow control	
VLAN Default Settings One VLAN is created (this is also the management VLAN).		
VID	1	
Registration	Fixed for the Ethernet and ADSL ports	
Tagging	Untagged for all ports	
STP Default Settings		
Enable/Disable State	Disabled	
STP Version	MSTP	
Operational Mode:	auto	
ADSL Profile Default Settings		
Name:	DEFVAL	
Latency Mode	Interleave	
	Upstream ADSL Settings:	Downstream ADSL Settings:
Maximum Rate	1000 Kbps	24000 Kbps
Minimum Rate	32 Kbps	64 Kbps
Interleave Delay	20 ms	20 ms
Maximum Signal to Noise Ratio	31 db	31 db
Minimum Signal to Noise Ratio	6 db	6 db

Table 189 Default Settings

Target Signal to Noise Ratio	12 db	12 db
Rate Adaptation Mode	Startup	Startup
Up Shift Margin	15 db	15 db
Down Shift Margin	9 db	9 db
SHDSL Profile Default Settings		
Name:	DEFVAL	
Maximum Rate	2304 Kbps	
Minimum Rate	192 Kbps	
Annex Mode	annex b	
Wire Pair	2wire	
Line Probe	disable	
VDSL General Settings		
State	Disable	
Upstream Power Back-off	Off	
Frequency Plan	998	
VDSL Profile Plan	12a	
RFI Band	Disable	
RFI Custom	Disable, all customized entries are 0~0	
VDSL Profile Default Settings		
Name:	DEFVAL	
Latency Mode	Interleave	
	Upstream Settings:	Downstream Settings:
Maximum Rate	45440 kbps	100032 kbps
Minimum Rate	64 Kbps	64 Kbps
Interleave Delay	8 ms	8 ms
Maximum Signal to Noise Ratio	31 db	31 db
Minimum Signal to Noise Ratio	0 db	0 db
Target Signal to Noise Ratio	9 db	9 db
Rate Adaptation Mode	Startup	Startup
Up Shift Margin	15 db	15 db
Down Shift Margin	9 db	9 db
Default ATM Profile Settings		
Name:	DEFVAL	
Traffic Class:	UBR	
PCR:	300000 cell/sec.	
CDVT:	0	
Virtual Channel Default Settings[A]		
VPI:	0	
VCI:	33	

Table 189 Default Settings

Multiplexing:	LLC-based
PVID:	1
Priority	0
ATM Profile:	DEFVAL
Default IGMP Filter Profile Settings The **DEFVAL** IGMP filter profile is assigned to all of the ADSL ports by default. It allows a port to join all multicast IP addresses (224.0.0.0~239.255.255.255).	

A. The ADSL ports' PVCs use ATM Adaptation Layer (AAL) 5. They also use RFC 1483 encapsulation.

Specifications

Table 190 MSC1000G Specifications

Dimensions	267.4mm(w) x 231.0mm(D) x 37.55mm(H)
Device Weight	1 Kg
Management Interfaces	In-band Ethernet management One 100 Mbps Fast Ethernet RJ-45 port for out of band management One RS-232 (DB-9 type) console port for local management
Power Specification	Power Rating: 1A MAX Power Consumption: 30W
Switching	Switching fabric capability: 24Gbps, non-blocking full duplex Forwards IEEE 802.3, IEEE 802.1Q, Ethernet II frames Prevents the forwarding of corrupted packets Operates at L2 switch mode Supports 16K MAC entries Supports 4K VLAN entries
Standards Compliance	IEEE 802.1p, 802.1Q IEEE 802.3u/3z/3x/3ab SFF committee INF-8074i Specification SFP (Small Form factor Pluggable) transceiver rev.1.0
Operation Temperature	0 ~ 50 degrees C
Storage Temperature	-40 ~ 70 degrees C
Operation Humidity	20% ~ 95% RH (non-condensing)

Table 190 MSC1000G Specifications

Storage Humidity	5% ~ 95% RH (non-condensing)
Certifications	CE Conformity FCC ITU-T K.20 Safety IEC 60950-1 EN 60950-1 CSA 60950-1 UL 60950-1 EMC EN 300386 EN 55022 EN 61000-3-2 EN 61000-3-3 EN 55024

Features

This section introduces the IES-5000 features.

Table 191 IES-5000 Features

Basic Function	Power-On System Test (POST) LED display (SYS/ST/ALM) Uplink Interface Gigabit Ethernet Thermal cutoff protection Temperature and voltage monitoring and threshold setting
Management Interfaces	In-band Ethernet management External alarm inputs interface One 100 Mbps Fast Ethernet RJ-45 port for out of band management One RS-232 (DB-9 type) console port for local management

Table 191 IES-5000 Features (continued)

Management Features	Command Line Interface (CLI) DSL profile function for managing DSL line card connections Firmware upgrade through FTP or SFTP and serial console port Telnet or SSH management (up to 4 concurrent sessions) IEEE 802.1X port-based authentication RADIUS client support for user's name and password Text-based configuration file via FTP or SFTP UNIX syslog SSH version 2 SFTP (secure FTP) NTP IP ping and traceroute functions SNMP Firmware download Database backup/restore Fault and alarm management Programmable alarm filters (threshold) Configuration management Performance counters Performance statistics (15m/24h) Access control Event log Internal trace and debug
Security Features	Detection of DOS attacks*
SNMP Management	SNMPv1/v2 SNMPv3 with optional SNMPv2c read-only SNMP Trap v1/v2/v3 SNMP agent
MIBs	RFC1213 MIBII (system, interface, …) ADSL line MIB ADSL extension line MIB SHDSL line MIB Bridge MIB Bridge MIB Extension RMON MIB
VLAN	VLAN cross-connect VLAN cross-connect: map DSL line (VPI/VCI) to one VLAN (maximum 4K VLAN) Residential bridging: user to user traffic can be blocked VLAN Tag-based Transparent LAN Service (TLS) or Q-in-Q/VLAN stacking Number of VLAN IDs: 4096 MAX number of VLAN + MAC per ADSL port: 256 UI Isolation ADSL2/2+, SHDSL: accept untagged frame from CPE

Table 191 IES-5000 Features (continued)

Quality of Service	IEEE 802.1p IEEE 802.1p for QoS function at VLAN level Minimum of priority queues SPQ and WRR support for the queues Mapping of priority to a queue by a configurable table PVC default priority DSCP-IEEE 802.1p mapping
Priority queuing	The priority queues are configurable based on the PVC: ATM QoS to IEEE 802.1p priority mapping The priority queues shall be configurable based on the PVC ATM service types (UBR/ CBR /rt-VBR/nrt-VBR) to 802.1p priority mapping
Layer 2 Bridging	LLC and VC MUX bridging (RFC2684) MAC address table: Up to 16K entries MAC addresses per port: Up to 128 IEEE 802.1d transparent bridging IEEE 802.1w rapid spanning tree protocol for network interface ports Auto MAC address learning MAC aging-out time IEEE 802.1p priority queue mapping (static mapping) Limiting number of MAC per port Static MAC address filtering Port Isolation (per system) DHCP relay option 82 (globally, per VLAN) Port-based VLAN tagging on subtending network interface port Broadcast storm control
Multicast Features	IP multicast forwarding IGMP Proxy IGMP snooping v1&v2 (port based) VLAN-aware IGMP snooping IGMP multicast channel limiting by group count or bandwidth usage Static multicast addresses 128 Broadcast methodology IGMP membership reports All video group address are configured in the system Tracking MAC address with IGMP Multicast VLAN (16 VLANs)
ACL/Filtering	L2 frame filtering, such as based on source MAC address, port etc. PPPoE filtering Layer 3 filtering based on IP header: source addresses, destination addresses, protocol ID, UDP/TCP port number ARP broadcast filtering NetBIOS filtering DHCP broadcast filtering IGMP filtering Rate limiting Rate limiting per XDSL port Rate limiting per XDSL VC Rate limiting per Ethernet port (MSC1000G ports in subtending mode)

Table 191 IES-5000 Features (continued)

Per DSL Port Provisioning	Per port limitations: Number of ACL Profile: 8 Number of DHCP snooping table entries: 32 Number of static DHCP snooping table entries: 3 Number of MAC filters: 10 Number of MVLAN: 4 Number of OUI Filter: 10 Number of PVCs (PVC, PPVC member, TLS PVC, PAEPVC): 8 Number of PPVCs: 2 Number of VLANs: 16
System-wide Provisioning	Number of VLANs: 4094 ADSL profiles: 128 SHDSL profiles: 128 ATM profiles: 128 IGMP filter profiles: 128 ALARMADSL profiles: 128 ALARMSHDSL profiles: 128 DHCP relay servers: 32 IP routes: 16 Static multicast addresses: 128 MAC filters: 512 MVLAN: 16 Multicast groups per MVLAN: 16 Multicast bandwidth control groups: 96 IGMP groups: 16 VLANs, 256 groups per linecard User (administrator) accounts: 16

Table 192 Supported Standards

STANDARD	DESCRIPTION
RFC 867 RFC 868 RFC 1305	Daytime protocol Time protocol Network Time Protocol (NTP)
RFC 1112 RFC 2236 RFC 3376	Internet Group Multicast Protocol (IGMP)
RFC 1213 RFC 1573 RFC 1757 RFC 2662 RFC 2665 RFC 2674 RFC 2863 RFC 3440 RFC 3635 RFC 3636	Simple Network Management Protocol (SNMP)
RFC 1483	Multiprotocol Encapsulation over ATM Adaptation Layer 5
RFC 2131 RFC 2132 RFC 3046	Dynamic Host Configuration Protocol (DHCP)

Table 192 Supported Standards (continued)

STANDARD	DESCRIPTION
RFC 2138 RFC 2139	Remote Authentication Dial In User Service (RADIUS)
RFC 2486	Extensible Authentication Protocol (EAP)
RFC 2684	LLC and VC MUX Bridging
IEEE 802.1D IEEE 802.1w IEEE 802.1s	Spanning Tree Protocol (STP) Rapid Spanning Tree Protocol (STP) Multiple Spanning Tree Protocol (MSTP)
IEEE 802.1d	Transparent Bridging
IEEE 802.1p	Layer 2 Traffic Prioritization
IEEE 802.1Q	Virtual Local Area Network (VLAN)
IEEE 802.1x	Network Authentication
IEEE 802.3ab	1000Base-T
IEEE 802.3ad	Link Aggregate Control Protocol (LACP)
IEEE 802.3u	100Base-T
IEEE 802.3x	Flow Control, Fast Ethernet
IEEE 802.3z	1000Base-X
ANSI T1.413 issue 2	ADSL Operational Mode

Firmware Naming Conventions

A firmware version includes the model code and release number as shown in the following example.

Firmware Version: V3.70(LU.0)

"LU" is the model code.

"0" is this firmware's release number. This varies as new firmware is released. Your firmware's release number may not match what is displayed in this User's Guide.

Console Port Pin Assignments

In a serial communications connection, generally a computer is DTE (Data Terminal Equipment) and a modem is DCE (Data Circuit-terminating Equipment). The MSC1000G is DCE when you connect a computer to the console port.

Figure 194 Console Port Pin Layout

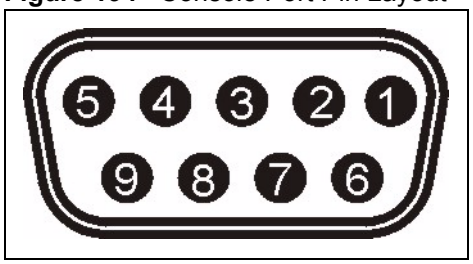


Table 193 Console Port Pin Assignments

CONSOLE PORT RS – 232 (FEMALE) DB-9F
Pin 1 = NON Pin 2 = DCE-TXD Pin 3 = DCE –RXD Pin 4 = DCE –DSR Pin 5 = GND Pin 6 = DCE –DTR Pin 7 = DCE –CTS Pin 8 = DCE –RTS PIN 9 = NON
The CON/AUX port also has these pin assignments. The CON/AUX switch changes the setting in the firmware only and does not change the CON/AUX port's pin assignments.

ALARM Connector Pin Assignments

The ALARM connector is a DB15F connector.

Figure 195 ALARM Connector Pin Layout

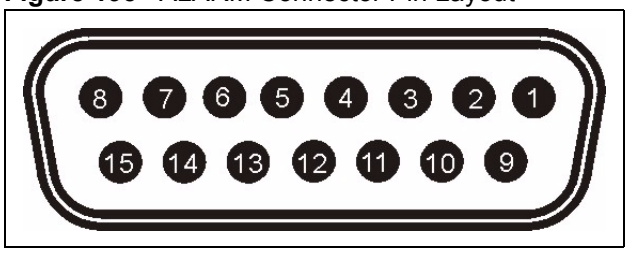


Table 194 ALARM Connector Pin Assignments

PIN	DESCRIPTION
1	Common pin for alarm input 1
2	Common pin for alarm input 2
3	Common pin for alarm input 3
4	Normal close for minor alarm output
5	Normal open for minor alarm output
6	Common pin for major alarm output
7	Normal close for critical alarm output

Table 194 ALARM Connector Pin Assignments

PIN	DESCRIPTION
8	Normal open for critical alarm output
9	Normal close for alarm input 1
10	Normal close for alarm input 2
11	Normal close for alarm input 3
12	Common pin for minor alarm output
13	Normal close for major alarm output
14	Normal open for major alarm output
15	Common contact for critical alarm output

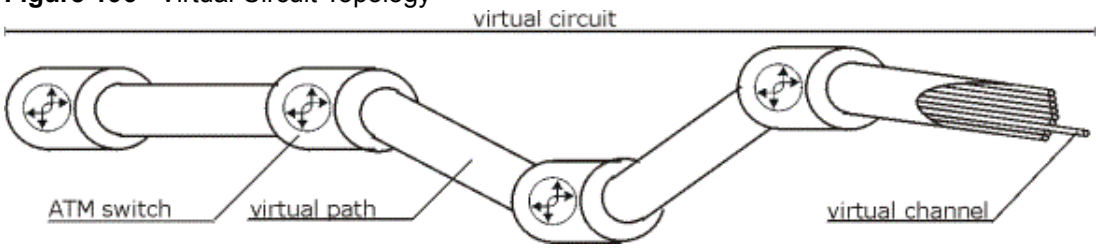
B

Virtual Circuit Topology

ATM is a connection-oriented technology, meaning that it sets up virtual circuits over which end systems communicate. The terminology for virtual circuits is as follows:

- Virtual Channel Logical connections between ATM switches
- Virtual Path A bundle of virtual channels
- Virtual Circuits A series of virtual paths between circuit end point

Figure 196 Virtual Circuit Topology



Think of a virtual path as a cable that contains a bundle of wires. The cable connects two points and wires within the cable provide individual circuits between the two points. In an ATM cell header, a VPI (Virtual Path Identifier) identifies a link formed by a virtual path; a VCI (Virtual Channel Identifier) identifies a channel within a virtual path.

The VPI and VCI identify a virtual path, that is, termination points between ATM switches. A series of virtual paths make up a virtual circuit.

C

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D

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- Product model and serial number.
- Warranty Information.
- Date that you received your device.
- Brief description of the problem and the steps you took to solve it.

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"+" is the (prefix) number you dial to make an international telephone call.

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